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# STATEMENT ON WATER QUALITY CONDITIONS, CHICAGO AND ENVIRONS

Public Health Service
Chicago, Illinois

August 1963

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# STATEMENT

on

# WATER QUALITY CONDITIONS

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# CHICAGO AND ENVIRONS

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Division of Water Supply and Pollution Control
Region V Chicago, Illinois

TABLE OF CONTENTS


| Chapter | | Page |
|---|---|---|
| I. | INTRODUCTION | 1 |
| | Chicago and Environs | |
| II. | PRESENT WATER QUALITY | 8 |
| | The Main Channel System<br>The Cal-Sag Channel<br>Calumet Watershed Complex<br>Lake Michigan<br>Fox River | |
| III. | WASTE SOURCES | 26 |
| | Municipal Wastes<br>Industrial Wastes<br>Combined Sewer Overflows<br>Pollution from Vessels<br>Wastes from Federal Installations | |
| IV. | WATER QUALITY IMPROVEMENT MEASURES | 36 |
| | Exclusion of Wastes at the Source<br>Storm Water Overflow Control<br>Waste Treatment Techniques and Rearch<br>Dispersal of Residues<br>Operations | |
| V. | FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS | 43 |

TABLES


1 Members of Technical Committee

2 Sources of Sewage Pollution - Illinois River System Main Stem - North Branch Chicago River Subbasin

3 Sources of Sewage Pollution - Illinois River System Main Stem - Lake Michigan to Kankakee River

4 Sources of Sewage Pollution - Illinois River System Main Stem - Des Plaines River Subbasin

5 Sources of Sewage Pollution - Illinois River System Main Stem - DuPage River Subbasin

6 Sources of Sewage Pollution - Illinois River System Main Stem - Calumet-Sag Channel and Tributaries

7 Sources of Sewage Pollution - Lake Michigan - Calumet River Complex

8 Sources of Sewage Pollution - Lake Michigan - Waukegan - Highland Park Area

9 Sources of Sewage Pollution - Illinois River System Main Stem - Fox River Subbasin

10 Industrial Waste Inventory - Illinois River System

11 Industrial Waste Inventory - Calumet Area in Northwest Indiana

12 Industrial Waste Inventory - Lake Michigan from the Illinois-Wisconsin Line Southeast to Burns Ditch

13 Sources of Vessel Pollution - Chicago and Environs

14 Federal Installations

15 Federally Aided Sewage Treatment Works Projects

FIGURES


1 Great Lakes and Illinois River Basins

2 Chicago Area and Environs

3 DO Averages, July and August, 1961, Upper Illinois River System

4 Combined Sewer Overflows

5 BOD Averages, April-May and June, 1961, Upper Illinois River Basin

6 Coliform and Fecal Streptococcus Densities - Geometric Means, Upper Illinois River System

7 ABS Averages, January and February, 1962, Upper Illinois River System

8 Mean Numbers of Benthic Organisms, Upper Illinois River System, July, 1961 - June, 1962

9 Map - Chain O'Lakes Area, Fox River Basin

10 Sources of Pollution - Municipal Wastes - Upper Illinois River

11 Sources of Pollution - Municipal Wastes - Little Calumet River Area

12 Sources of Pollution - Industrial Wastes - Upper Illinois River

13 Industrial Intakes and Outfalls - Calumet Area

14 Significant Federal Installations

15 Federally Aided Sewage Treatment Works Projects - Chicago and Environs

# I - INTRODUCTION

This is a statement covering certain aspects of a comprehensive study of water quality in the Great Lakes and Illinois River Basins. The Great Lakes and their tributaries are part of the St. Lawrence River system, draining to the Atlantic Ocean - while the Illinois River drains to the Gulf of Mexico through the Mississippi River. (See Figure 1.) The two Basins are being studied jointly because of their interrelation at the city of Chicago, which straddles the divide between them. Together, the two basins comprise the study area of the Great Lakes-Illinois River Basins Project. The GLIRB Project, of the Public Health Service, is attached to Region V, Department of Health, Education, and Welfare. The work of the Project is part of the Public Health Service's Water Supply and Pollution Control Program.

The Project was initiated in late 1960, and began full-scale operations in the spring of 1961. Space for laboratories and headquarters was obtained in the Army's Quartermaster Depot at 1819 W. Pershing Road, Chicago. Some 29,000 square feet of warehouse space was renovated and converted for the purpose, about half of this being devoted to laboratories. At full strength, the Project staff numbers slightly over 150 people, some of whom are now working in the Lake Erie Field Station, established last year at Cleveland, Ohio. The permanent staff includes specialists covering a broad gamut of professional skills, including sanitary and hydraulic engineers, chemists,

biologists, bacteriologists, radiochemists, oceanographers, and economists. Valuable counsel and advice have been received from a Technical Advisory Committee, appointed by the Surgeon General. Membership on this Committee is composed of men in responsible positions in State water resource and water pollution control agencies, municipal water and sewer departments, private research organizations, conservation groups, and industry. Table 1 gives the composition of the Committee. Special assistance has been obtained from other federal agencies.

The Corps of Engineers and the Bureau of Commercial Fisheries, Fish and Wildlife Service, are furnishing boats and other facilities, and cooperating on certain elements of the studies. Special studies concerning water-oriented recreation, and fish and wildlife aspects, are being made by the Bureaus of Outdoor Recreation, and Sport Fisheries and Wildlife, respectively. The U. S. Geological Survey provides routine and special information on stream flows and ground water hydrology. Other federal agencies have rendered valuable assistance.

The State Sanitary Water Board of Illinois and the Indiana Stream Pollution Control Board have participated actively in the studies. Other groups whose cooperation and assistance have been very helpful include: Northeastern Illinois Metropolitan Area Planning Commission; Chicago Association of Commerce and Industry; clean streams committees; civic groups; and individuals too numerous to mention.

The Great Lakes Basin, with a total drainage area of some

290,000 square miles, is one of the major watersheds of the North American continent. The Basin is roughly oval in shape, with an elongated east-west dimension of about 900 miles, and a width north and south of about 500 miles. The much smaller Illinois River Basin extends in a southwesterly direction, from its common boundary with Great Lakes Basin at the southern tip of Lake Michigan to the Junction with the Mississippi River, 30 miles north of St. Louis, Missouri. It is about 300 miles long and 100 miles wide, and encompasses an area of 29,000 square miles.

At the 1960 census, 27.5 million people resided within the Illinois River Basin and the United States portion of the Great Lakes Basin. This represents 14 percent of the population of the United States. The area contains 31 of the nation's 212 urban centers classified by the Census Bureau as Standard Metropolitan Statistical Areas. Roughly four-fifths of the population is concentrated within these 31 centers. As a further indication of the highly urbanized nature of the region, 58 percent of the population is included in the five largest metropolitan areas. These are: Chicago and contiguous northwestern Indiana, with 6.9 million people; Detroit, 3.8 million; Cleveland, 1.8 million; Buffalo, 1.3 million; and Milwaukee, 1.2 million.

The economic development of the Study Area is at an advanced stage. In value added in manufacturing, it contributes about a fourth of the national total. Its state of maturity is manifested by the

extent and variety of activities conducted in the area as well as by the population concentrations. The reasons for rapid progress in the relatively short time since pioneer days are to be found in the area's wealth of natural resources; its transportation advantages; and, in large though indeterminate measure, in the tremendous value of the Great Lakes as a water resource.

The average annual runoff (an approximate measure of the perennially renewable water supply) in the Great Lakes Basin, at the head of the St. Lawrence River, is about 235,000 cubic feet per second (cfs). An outstanding characteristic of the Great Lakes natural water system is the high degree of uniformity in stream flows. This feature is due to the high ratio of lake surface area to total drainage area. Some idea of the regulating effect can be gained from the fact that the total annual volume of runoff, some 50 cubic miles, would, if spread uniformly over the 95,000 square miles of lake surface, cover it to a depth of less than three feet.

The bulk of water used by the cities and industries that ring the Great Lakes is drawn from the Lakes. After use, this water (except at Chicago) is returned to the source Lake - somewhat diminished in quantity and bearing contaminants of great variety in type and concentration. These water-borne wastes originating from the activities of man, together with the pollutants carried by natural runoff, constitute a potential hazard to the present and future quality of water in the Lakes. Protection of the quality of water in the Great Lakes is the number one problem in the conservation

of this priceless natural resource.

With the foregoing overview as a background, the rest of this statement will be devoted to a more detailed discussion of a small but important part of the total area - the subregion comprising the city of Chicago and its environs (Figure 2).

Chicago and Environs

For the purposes of this report, the area henceforth under consideration lies within and comprises most of the six Illinois counties of the Chicago Standard Metropolitan Statistical Area (SMSA) and the two Indiana counties that make up the Gary-Hammond-East Chicago SMSA. With respect to its "water geography", the area is divided into five parts, as follows:

1) The main connecting channel between Lake Michigan and the Illinois River, extending from Lake inlets at Wilmette and the Chicago River mouth, through the North Shore Channel, North Branch of Chicago River, Chicago Sanitary and Ship Canal, and Des Plaines River, to the confluence of the Des Plaines and Kankakee Rivers;

2) The Calumet-Sag Channel and that portion of the Calumet River System presently tributary to the Illinois River including Wolf Lake;

3) The Calumet Area of northwest Indiana presently tributary to Lake Michigan;

4) Local waters of Lake Michigan, along the shoreline from the Wisconsin-Illinois State line southward and eastward to include the mouth of Burns Ditch in Indiana; and

5) A portion of the Fox River extending from the Wisconsin-Illinois State line southward through the urbanized area of metropolitan Chicago, including the Fox Chain O'Lakes.

Chicagoland - to use its locally popular name - is both the largest urban center in the Great Lakes Basin and the least favorably situated one with respect to water supply and water-borne waste disposal. Located at the southern dead end of Lake Michigan, and standing astride a continental divide, it could not resort to the expedient typical of other large cities, that is, drawing water supply from its uphill side and discharging waste waters on the downhill side. The area's dilemma is alleviated by the unique geography created by the Ice Age. In the first place, nowhere else in the world is so large a body of fresh water as Lake Michigan to be found so close to the headwaters of a drainage basin. Second, the top of the divide, in Chicago, is only about 10 feet above the water level of Lake Michigan. Finally, the Des Plaines River, on the other side of the divide, has an elevation some 30 feet lower than Lake level; this made it possible to cut a water-level channel through the divide and induce gravity flow westward across the divide without pumping.

In 1900, as a result of a succession of water-borne epidemics in Chicago, the first canal through the divide was put into operation. Through this canal the bulk of the area's waste waters were diverted to flow down the Illinois River; additional lake water was diverted for dilution of the then untreated wastes. Subsequently, progressive technological improvements have been made, in the way of interception, collection, and treatment of wastes prior to discharge. There has been a continuing series of lawsuits relative to diversion of Great Lakes

water, beginning shortly after the canal was opened, with the latest litigation still in progress before the United States Supreme Court.

Following entry of the United States Government as a party litigant in the current Chicago diversion case in February 1960, the Department of Justice requested the Public Health Service to render professional assistance, in the way of fact-finding investigations, and recommendations consonant with the protection of the public health and general welfare. To accomplish these purposes, in connection with the development of long range comprehensive basinwide plans, the Great Lakes-Illinois River Basins Project was created in September 1960.

In July of this year (1963) the Project substantially completed its role in the diversion hearings. A series of 17 formal reports and supplementing memoranda were prepared for the Justice Department, presented in evidence, and used as the basis for oral testimony before the Special Master in Chancery appointed by the Supreme Court to conduct hearings. The information gathered, and the conclusions reached for that purpose, also support the following brief summary of the water quality management situation in the area previously described.

# II - PRESENT WATER QUALITY

This chapter describes the water quality conditions in each of the five water zones previously defined; the following chapter contains inventories of waste sources in each zone. Beginning in 1961, a series of sampling surveys and other studies have been carried out in the area. The water quality studies encompassed the measurement and evaluation of over thirty separate parameters. Of these, the parameters or indicators considered most important and relevant to the alleviation of immediate pollution problems in the area are discussed herein. These are: Dissolved Oxygen (DO); Biochemical Oxygen Demand (BOD); Coliforms and pathogenic bacteria; detergents (ABS); persistent organic chemicals; aquatic nutrients; temperature; degradable organic chemicals and sludge; and the biological indicators. In the Lake Michigan waters the additional parameters phenol and ammonia are discussed.

## The Main Channel System

This channel begins at Wilmette, Illinois, with controlling works regulating the inflow of Lake Michigan water. It flows south, through the north part of the City of Chicago, receiving tributary flow from the North Branch of the Chicago River and the effluent from the north side Metropolitan Sanitary District plant, to the confluence, in the Loop, with the Chicago River. Waters entering from the lake here, through controlling works, merge and flow south,

then southwest to receive the effluent of the Stickney Works of the Metropolitan Sanitary District, then to the confluence with the Cal-Sag Channel; the combined flows continue in a southwest direction to controlling works at Lockport, then merge with the Des Plaines River, just above Dresden Dam, to form the Illinois River. In this seventy miles of stream are discharged the total waste effluents of the Chicago area community, except for the fraction entering Lake Michigan. These discharges consist of the effluents of the three large Metropolitan Sanitary District plants, storm water overflows, cooling water and industrial discharges, and miscellaneous outfalls unconnected to the main Metropolitan Sanitary District system.

The principal pollutional problems are lack of dissolved oxygen with correspondingly high BOD, extremely high coliform count with confirmed presence of pathogenic bacteria, high levels of nutrients that affect the quality of water farther downstream, presence of excessive levels of persistent organic chemicals such as ABS, a large rise in stream temperature to further intensify the adverse effects of oxygen demand, oxygen-consuming and unsightly sludge deposits, refuse, garbage, and waste matter floating on the surface, and a biology limited to only those organisms, such as sludgeworms, capable of living in rich organic environments.

## Dissolved Oxygen

The waters entering the system at Wilmette and the Chicago River are saturated with DO. As they flow downstream, the entrance of oxygen-demanding wastes rapidly depletes this resource and in certain seasons reduces it to zero. This had occurred in the North Branch near its confluence with the Chicago River and again below the Stickney Works - see Figure 3. DO levels do not recover until passage over the dam at Brandon, where it is restored by aeration. Further recovery is experienced at Dresden, where the cleaner waters of the Kankakee contribute to the recovery.

## Biochemical Oxygen Demand

The oxygen-demanding wastes discharged to the watercourse are immediately in evidence following the entrance of Lake Michigan waters to the system. The discharges of the North Side and Stickney Works, although fully treated by conventional means, are yet of sufficient strength and volume to create large increases in oxygen demand. To these demands are added the raw sewage spilled over from numerous storm water overflows that discharge into this stream, usually during storm periods, but occasionally when gates do not close properly. (See Figure 4, Combined Sewer Overflows) Other oxygen-demanding wastes, from miscellaneous sources, and the large accumulations of organic sludge, resulting from both the solids discharges of the treatment plants and the raw sewage from

storm water make up the total load carried by the stream. Figure 5 presents a typical BOD profile for this stream.

## Coliforms and Pathogens

Figure 6 presents representative coliform densities found during the study. It is quite apparent that densities approaching levels present in raw sewage can be encountered, and the averages are far higher than any levels considered safe. These observations are further substantiated by a special attempt to isolate particular pathogenic organisms, which confirmed the presence of enteric pathogens, including polio and ECHO viruses, in over 40 percent of the samples collected. The levels indicate a direct hazard to health, for those people whose work requires them to come into some contact with the water.

## Detergents (ABS)

The presence of ABS is widely evident in visible foam on streams throughout the Chicagoland area, especially in the vicinity of sewage treatment plant outfalls, below spillways, and at other places where the water is agitated.

Figure 7 presents data on ABS concentrations in the areas, obtained from analyses of samples collected in January and February 1962. Except for waters entering inlets from Lake Michigan, waters from nearly every station sampled revealed ABS concentrations greater than 0.5 milligrams per liter (mg/l).

Values as high as 2.0 mg/l were found below the principal treatment plant discharges.

## Nutrients - Phosphate and Nitrogen Compounds

Among the components of domestic and industrial waste are chemical compounds that act as nutrients, or fertilizers, to the natural biological life of a stream. The most important of these are the phosphates and compounds of nitrogen. These compounds are not readily removed by conventional treatment, and their presence in effluents results in considerable water quality degradation in downstream areas under conditions favorable to growth of algae.

Some sections of the main channel system contain as much as 10 mg/l of phosphate in some parts and carry 3 mg/l into the Illinois River in low flow seasons. Part of this is due to the domestic and industrial wastes of the Chicago area, and a sizable amount is contributed by the Blockson Works Plant, Olin Mathieson Chemical Corporation, in the Joliet area.

The nitrogen contributions to the main stem are principally from the Metropolitan Sanitary District effluents. The stream carries high levels of ammonia and organic nitrogen, which undergo metabolic changes in the stream and result in a sizable secondary oxygen demand in downstream portions of the Illinois River. The effect of these nitrogenous residues is further exhibited by their fertilizing action. The net result of the combined effects of the high phosphate and nitrogenous residues is continued

degradation of downstream water quality by the twofold action of reduced oxygen levels and high algal productivity, which creates water use problems of its own. The problem of nutrient removal is one of the principal unsolved problems to be faced by pollution control agencies and should be highlighted in research plans of all interests concerned with preservation of water quality.

## Temperature

The waters of Lake Michigan are relatively cold at their point of entry into the main channel. Contributions of waste water by the Metropolitan Sanitary District (MSD) discharges and by at least three large power plants quickly raise the temperature of the waterway an average of 9-10°C. It has been estimated that about 56 percent of this rise in temperature is due to the power plant cooling waters. The effect of this temperature rise is to increase the rate of oxygen uptake by the waste assimilation processes of the stream and to reduce the oxygen capacity of the stream. Both of these effects are detrimental.

## Organic Solids

Studies made on the effluents of the MSD plants showed an average discharge of about 120 tons per day of suspended material, on an annual basis. Similar studies on one of the storm overflows in the Chicago area showed that contributions from this source would average 25 tons per day distributed throughout a year

by typical annual storm patterns. The combined loading to the waterway presents itself throughout the length as sludge deposits. These deposits ferment constantly under anaerobic conditions, produce nauseous appearance, odors, and gas bubbles, and exert additional oxygen demands on the stream. One of the most important considerations in the improvement of the waters in the waterway system will be the removal of these organic solids through additional treatment and the elimination of combined sewer systems.

## Biology

Studies of the biological life of the main stem confirm the findings of gross pollution noted above. The biology of this stream is one of complete barrenness in certain zones, along with extremely high numbers of the tubificid worms (sludgeworms) at many points along its course. A clean water stream would have many varieties of aquatic life, including fish and bottom dwellers. This stream has no fish and only one or two varieties of bottom life, which, when present, are found in tremendous numbers. Figure 8 presents a summary of the bottom dwelling organisms found in these waters and attests to the degradation of its water quality.

### The Cal-Sag Channel

The Cal-Sag Channel originates at the Calumet Harbor inlet and normally flows west through the controlling works at Blue Island (soon to be changed to the O'Brien Locks just south of

Lake Calumet), to its junction with the main stem at Sag junction, a distance of about 32 miles. In its flow westward it receives drainage outflow from Lake Calumet, the Grand Calumet River, the Calumet treatment plant of the Metropolitan Sanitary District, and the Little Calumet River, with incidental drainage from the surrounding areas. The stream normally flows westward; but many times, particularly following periods of heavy rainfall, it has been known to flow in the opposite direction, with the divide near the confluence of the Little Calumet River.

## Dissolved Oxygen

Waters entering the Cal-Sag channel system from Lake Michigan are high in DO, about 7 mg/l (see Figure 3) although not up to saturation level, probably because of the effects of frequent reversals of flow. As they proceed westward, the DO level drops to about 1-2 mg/l in the vicinity of the Calumet treatment works. A slight rise occurs here due to the high oxygen content of this effluent, but farther westward the minimum DO is reached near the junction with the main stem. Although DO levels are highly depleted, reflecting gross pollution in the stream, its condition does not reach the zero levels found along the main stem.

## BOD

The BOD at the inlet to the Cal-Sag system from Lake Michigan is higher than waters representative of the Lake

(see Figure 5). This can be attributed to the reversals of flow previously described. As the waters flow westward, a large increase in BOD occurs in the vicinity of the Calumet treatment works outfall. Farther downstream, the BOD is gradually reduced, due to natural purification processes, but does not approach a satisfactory level even at the confluence. The satisfaction of this BOD, coupled with the oxygen demands of the sludge beds in this channel, combine to produce the low DO levels found in this stream.

### Coliforms and Pathogens

The conditions described for the main stem apply equally to this stream. The high coliform densities (Figure 6) throughout its length are a definite hazard to health. Likewise, the high coliforms encountered at the inlet to this stream may be a major source of pollution of Lake Michigan during the periods of stream reversal previously noted.

### Persistent Chemicals, Nutrients, Temperature, Solids, and Biology

The conditions described for these parameters in the main stem apply equally to this channel. Biological findings at the inlet further confirm the effects of reversal of flow by the presence of large numbers of sludgeworms at this point.

## Calumet Watershed Complex

### Grand Calumet River and Indiana Harbor Canal

This stream originates at Gary, Indiana, and flows westward, receiving large volumes of effluents from the industries at Gary and the effluents from the Gary, Hammond, and East Chicago sewage treatment plants. Much of the flow originating from the Gary area is diverted north through the Indiana Harbor Canal and enters Lake Michigan. Part of the Hammond discharge also flows in this direction at times, with the remainder flowing west to the confluence with the Cal-Sag. During storm periods, these flows may move in either direction.

The DO levels in this stream are comparable to those found in the upper waterway. Low DO levels predominate in the waters diverted to Lake Michigan, and zero DO is found in the portion flowing westward into the Cal-Sag channel. The BOD levels are correspondingly high and increase sharply in the westernmost section of this stream. Coliform levels are also very high in all sections of the stream, approaching the levels present in raw sewage at its confluence with the Cal-Sag channel. The other parameters exhibit similarly high levels, except the portion of the stream draining into Lake Michigan. This portion shows a high ammonia level in relation to the total nitrogen content, a high phenol level, and a relatively low phosphate level. These relationships indicate that the waste discharges into this portion of the stream are predominantly industrial, masking the effects of the municipal discharges.

## Little Calumet River and Burns Ditch

Like the Grand Calumet, the Little Calumet flows in two directions. Originating east of Gary, in the Dunes area, it flows west to the Cal-Sag channel, but a large portion of the flow is diverted into Lake Michigan through Burns Ditch, located east of Gary. This stream receives the wastes from many small tributaries and small treatment plants with some industrial effluents. The eastern portion is comparatively clean, but the western portion, including that which drains east through Burns Ditch, exhibits levels of DO, BOD, and coliforms comparable to the other streams already described. The overall water quality of this stream is comparable to that described for the Cal-Sag channel.

## Lake Michigan

Water in the main body of Lake Michigan, as revealed by samplings at stations located 10 miles or more from shore, is of very high quality. Its nutrient levels are favorable, containing only traces of phosphate and oxidized nitrogen, sufficiently low to suppress the growth of undesirable planktonic organisms. Its mineral content is comparatively low and quite uniform except for some minor variability in some of the constituents. These constituents provide no problems with respect to the water uses encountered.

The inshore waters of the Lake, particularly in the southwest

sector, exhibit some significant variations from those described above and in some areas are sufficiently affected to cause impairment to water uses. Data collected by the Project, although incomplete, nevertheless are of sufficient volume to highlight some of the problems resulting from the waste discharges entering this sector of the lake.

## Dissolved Oxygen and BOD

Although DO concentration and BOD do not reach critical levels, there is exhibited sufficient change in these parameters, particularly in the Indiana Harbor area, to point to need for remedial measures. Levels of DO as low as 2.5 and BOD's up to 5.1 mg/l, have been recorded, indicating this as one of the major waste input sources. Fortunately, because of the large dilutions afforded by the lake, these conditions do not persist, except for this harbor area.

The Calumet and Chicago River harbors did not exhibit comparable levels, presumably because these harbors are input points into the Illinois River system rather than points of discharge. The limited number of Burns Ditch results indicated DO levels as low as 5.4 and BOD's up to 10.1 mg/l. The effects on adjacent waters in Lake Michigan are now being studied.

## Coliforms

In contrast with the coliform findings in the deep waters

of the lake, the coliform levels in the southwest sector provide ample evidence of pollution. Increased levels, as high as 1000/100 ml, were found as far out as 4 miles from shore, between the Wisconsin line and Gary, Indiana. In the Calumet Harbor area, the levels were comparatively low, probably due to little or no flow reversal encountered during this study period. Levels in the Indiana Harbor area were also comparatively low, although it is well known that this area receives effluents from two major municipal treatment works, Gary and East Chicago, Indiana. Limited sampling of Burns Ditch discharges by the Project have shown levels as high as 11,000 organisms per 100 ml, with levels up to 7,600 per 100 ml in adjacent Lake waters. Results from sampling in 1961 by the State Board of Health of Indiana showed levels as high as 430,000/100 ml, with 6 of 20 samples higher than 200,000.

The high coliform levels, and other pollutional effects, inhibit recreational opportunities in Lake Michigan waters, especially along Indiana shores. Bathing beaches in Chicago and the Chicago water intakes are affected from these sources under circumstances wherein the water movements of the lake are from south to north along the shoreline, or during periods of heavy storm runoff when the Calumet River discharges into the Lake.

## Persistent Chemicals and ABS

These materials are relatively low and present no particular problems to water users at this time, except during periods of water movement from south to north along the shoreline. During these periods of water movement, slugs of waste discharges have been known to remain undiluted for sufficient distance and time to produce marked taste and odor problems to the water supply of Chicago and adjacent cities. The Project is currently involved in a study of this problem and will attempt to pinpoint the sources of these wastes, as well as the extent of water damage involved. There is no doubt at this time that much of this originates in the industrial complex between Gary and the Calumet River, including the discharges from the Indiana Harbor Canal.

## Nutrients

Nutrient levels along the southwest shoreline, although very low when compared with the Illinois waterway, present a current problem to present-day water uses and a much greater potential problem to future water uses of Lake Michigan. Prolific growths of attached algae (Cladophora) periodically break off and are deposited on the Chicago beaches, causing nuisances from its decay. Regular occurrences of heavy plankton populations result in interference in water treatment processes, and reduction of filter plant productive capacity.

So long as nitrogen and phosphorus compounds are discharged into the Lake, these problems will intensify.

Long-range water quality considerations require that discharge of materials into the Lake be discouraged and that research in the removal of these materials from effluents be intensified.

## Phenol and Ammonia

These materials are basic components of industrial discharges from the industrial complex between Gary and the Calumet River. High phenol and ammonia levels, sufficient to affect municipal water supplies, have been found in this area. Phenols as high as 32 micrograms per liter have been found in the inshore waters and 52.4 in the waters of Indiana Harbor. Corresponding ammonia levels are 0.37 mg/l and 4.18 mg/l, respectively. The principal effects of these components are the taste and odor, and chlorination problems encountered in municipal water treatment processes. Although both of these components are subject to biological degradation, the cool temperatures of the Lake reduce the reaction rate. This, coupled with predominant water movements from south to north, results in recurring water treatment problems.

## Biology

The inshore areas of Lake Michigan from Calumet Harbor to Burns Ditch, Indiana, are degraded biologically, in degrees

ranging from "severe" near Indiana and Calumet Harbors to "mild" near Burns Ditch. The bottom-dwelling organisms are predominantly sludgeworms and bloodworms. These organisms favor a habitat of organic sediment and are very tolerant of poor water quality conditions. The aquatic scuds (Pontaporeia) that are predominant bottom dwellers throughout Lake Michigan, except near major waste sources, are almost nonexistent in these inshore waters. They prefer a sand and gravel habitat and require clean, clear water. However, the sludgeworms and bloodworms do not occur in large numbers as would be expected where organic sediments cover the lake bottom. This is attributed to the industrial wastes discharged in the Calumet and Indiana Harbor areas that are either toxic or inhibitory to those organisms.

Biological degradation is further evidenced by a paucity of planktonic algae even though nutrient levels are relatively high. Suspended solids emanating from the harbors inhibit the development of planktonic algae, either by reducing the transparency of the water and consequently limiting light penetration, or by toxic effects. Water transparencies are generally less than one meter in the lake waters as far as 4 miles off the Calumet area shoreline.

In the inshore area from the Wisconsin-Illinois state line south to Calumet Harbor, the benthic fauna consists of a varied population of organisms usually predominated by Pontaporeia.

At some stations, however, the oligochaete worms were numerous. The waters of this area are influenced by organic wastes discharged farther north in Wisconsin, and a standing crop of planktonic algae results that is sometimes 10 to 100 times more dense than the waters farther lakeward. In addition, these nutrient-rich waters produce luxuriant mats of filamentous algae (usually Cladophora) which cover all firm submerged attachment surfaces. They break loose during storms, or at maturity, and wash up on bathing beaches, foul fishing nets, and clog water intake screens. The death, deposition, and decay of algae results in a bottom habitat of organic sediment that is more favorable to sludgeworms and bloodworms and less favorable to the desirable aquatic scuds.

Fox River

This river originates in Wisconsin west of Milwaukee and flows south into Illinois, receiving waste discharges of man-made origin and the runoff from adjacent farm lands. In Illinois it passes through a series of recreational lakes known as the Chain O' Lakes (see Figure 9), where it receives septic tank effluent, the discharges of several sewage treatment plants, and local runoff. From its outlet at Lake Pistakee, it flows past the cities of Elgin, St. Charles, Geneva, Batavia, and Aurora to its confluence with the Illinois River, receiving the treated wastes from these and many smaller communities en route. It is predominantly a recreational stream, supporting many marinas.

The flow through Illinois is restricted by many small impoundments to provide sufficient water for these activities.

Water quality studies by the Project consisted of routine samples collected at its mouth during the study of the Illinois River and a short period of study of the Chain O' Lakes area by the Lake County Health Department, in which the Project provided laboratory support.

Samples collected at the mouth of the river are characterized by high DO levels, BOD's averaging between 3 and 10 mg/l in the three study periods, phosphates up to 1.0 mg/l, high nitrogen levels, and coliforms of 1,500 per 100 ml.

The Chain O' Lakes study showed DO as low as 3.0 mg/l, phosphate up to 0.76 mg/l, and ammonia of 1.09 mg/l at various sampling locations.

Plankton counts at the mouth of the river ranged from 5,700 to 35,000 organisms per ml, the dominant groups being diatoms, greens, and blue-greens, in that order. The Chain O' Lakes study showed counts as high as 56,000, dominated by blue-greens and diatoms.

In summary, the data reveal the principal water quality problems to be the high algae levels resulting from the nutrients present in the numerous sewage discharges and the slow flow-through and low velocity of these waters, tending to hold these nutrients in the zones of discharge.

# III WASTE SOURCES

This chapter presents a review of known wastes discharged in the Chicago and Environs area. The area is divided into five parts or sub-areas as described in Chapter I.

The presentation consists of five sections. The first section is a summary of municipal wastes, which includes domestic and industrial wastes discharged to municipal sewerage systems. The second section presents a summary of industrial wastes discharged directly to local watercourses. The third section pertains to combined sewer overflows. The fourth section is on pollution from vessels, and the fifth section concerns wastes from Federal installations.

## Municipal Wastes

Sewered communities, institutions, and commercial establishments such as motels are included in the municipal sewage inventory. Data were compiled from existing Federal, State, Local and Sanitary District reports and supplemented by field investigations. The reported data are for the year 1960, except that data for the Calumet Area in Northwestern Indiana are for the year 1961. Municipal systems serving 1,000 or more persons are tabulated individually by subbasin whereas those serving less than 1,000 persons are grouped by subbasin in Tables 2 to 9, inclusive, and depicted in Figures 10 and 11. The portion of the Fox River below Yorkville contributes minimal pollution to the Illinois River System and is therefore not shown in Figure 10.

Population equivalents (PE) are calculated on a 5-day biochemical oxygen demand (BOD) basis, using analytical data from GLIRBP studies or furnished by the plant or control agency and assuming each pound per day of BOD to be equivalent to six persons. The data presented for the subbasins in the Chicago and Environs area shows that 436 communities, institutions, and commercial establishments are served by 301 sewerage works. The total waste load to these systems is about 9,860,000 PE and the total load discharged to the watercourses is about 1,290,000 PE. The following table summarizes the waste loads by sub-areas:

| Sub-Areas | Waste Loads Population Equivalents Before Treatment | As Discharged |
|---|---|---|
| 1. The main connecting channel between Lake Michigan and the Illinois River, extending from Lake inlets at Wilmette and the Chicago River mouth, through the North Shore Channel, North Branch of Chicago River, Chicago Sanitary and Ship Canal, and Des Plaines River, to the confluence of the Des Plaines and Kankakee Rivers; exclusive of sub-area 2. | 7,828,300 | 968,100 |
| 2. The Calumet-Sag Channel and that portion of the Calumet River System presently tributary to the Illinois River; including Wolf Lake. | 1,163,280 | 182,500 |
| 3. The Calumet Area of northwest Indiana presently tributary to Lake Michigan | Included in Sub-Area 4 | |
| 4. Local waters of Lake Michigan, along the shoreline from the Wisconsin-Illinois State line southward and eastward to include the mouth of Burns Ditch in Indiana. | | |
| Sub-Area 3 | 420,060 | 55,665 |
| Waukegan-Highland Park Area | 207,900 | 26,965 |
| Total for Sub-Area 4 | 627,960 | 82,630 |

| | | |
|---|---|---|
| 5. A portion of the Fox River extending from the Wisconsin-Illinois State Line southward through the urbanized area of metropolitan Chicago, including the Fox Chain O'Lakes. | 238,910 | 59,600 |

In addition to sewered or partially sewered communities included in this section, there are many unsewered areas discharging septic tank effluents or raw sewage to local watercourses. There may be some cases where the overall waste contribution to a local watercourse is considerable, but in general these matters constitute local nuisances and sanitation problems. Loads from these sources are not included in the above table.

Industrial Wastes

The industrial waste summary encompasses industrial establishments that discharge directly to the receiving waters of the area.

Initial waste loads were compiled from State, County, City and Sanitary District records, and supplemented by data received from individual industries, regulatory agencies, and field investigation of known outfalls. For some industries, waste loads were estimated from data obtained from similar industries. Industries discharging waste loads of 1,000 PE or greater are tabulated individually by subbasin, whereas those with waste loads less than 1,000 PE are grouped by subbasin in Tables 1, 11 and 12, and depicted in Figures 12 and 13.

One-hundred and forty-three industries were reviewed in the study area. Those industries include 20 chemical plants, 11 iron and/or steel plants, 6 by-product coke plants, 4 paper and allied product plants,

7 oil refineries, 15 food processing plants and a variety of other diversified industrial enterprises. Most of these industries provide some type of waste treatment facilities and/or control measures.

The total industrial waste load discharged in the study area is about 1,183,000 PE and is summarized by sub-areas in the following table:

| Sub-Area | No. of Plants | Population Equivalent |
|---|---|---|
| 1. The main connecting channel between Lake Michigan and the Illinois River, extending from Lake inlets at Wilmette and the Chicago River mouth, through the North Shore Channel, North Branch of Chicago River, Chicago Sanitary and Ship Canal, and Des Plaines River, to the confluence of the Des Plaines and Kankakee Rivers, exclusive of sub-area 2. | 80 | 259,100 |
| 2. The Calumet-Sag Channel and that portion of the Calumet River System presently tributary to the Illinois River, including Wolf Lake | 36 | 92,000 |
| 3. The Calumet Area of northwest Indiana presently tributary to Lake Michigan; | (included in Sub-Area 4) | |
| 4. Local waters of Lake Michigan, along the shoreline from the Wisconsin-Illinois State line southward and eastward to include the mouth of Burns Ditch in Indiana. | | |
| Sub-Area 3 | 18 | 812,000 |
| Waukegan-Highland Park Area | 3 | 8,800 |
| Total for Sub-area 4 | 21 | 820,800 |
| 5. A portion of the Fox River extending from the Wisconsin-Illinois State Line southward through the urbanized area of metropolitan Chicago, including the Fox Chain O'Lakes | 8 | 11,200 |

Many industries discharge pollutants other than oxygen-demanding wastes that can adversely affect the receiving waters. The principal

non-oxygen demanding pollutants are inert solids, oil, dissolved solids, inorganic chemicals and certain organic chemicals and nutrients.

Combined Sewer Overflows

The overflow of raw sewage and industrial wastes mixed with storm water during periods of storm runoff constitutes a significant intermittent source of pollution of the waterways in the Chicago Area. The project conducted a pilot study in the area tributary to the three main sewage treatment plants of the Metropolitan Sanitary District of Greater Chicago for the purpose of estimating the amount of pollution from combined sewer overflows.

The pilot study was conducted on the area tributary to the Roscoe Street sewer. Results from the pilot study were translated by appropriate ratios to determine the BOD overflow load in each treatment plant area, tabulated as follows:

| Treatment Plant | Average Annual BOD Overflow Load lb/day |
|---|---|
| North Side | 7,100 |
| Stickney | 35,500 |
| Calumet | 4,300 |
| Total | 46,900 |

The total estimated load shown above is almost a third as much as the combined load to the stream system from the three MSD treatment plants.

Pollution from Vessels

During 1961, 69,360,548 tons of freight were handled in Chicago and environs from United States, Canadian and Foreign overseas vessels, comprising some 17,000 trips. These were made by cargo, tugboats, towboats, commercial fishing, shuttle and sightseeing vessels. The number and type of ships, cargo capacities, port time, passengers and pollutional estimates of vessels using the watercourses in the Chicago area during 1961 for international, intrastate and intraport commerce have been compiled in Table 13.

The number of pleasure craft having marine toilet facilities that used Lake Michigan in the Chicago area in 1961, has been estimated at 8,000 involving 160,000 trips.

The inadequate and/or non-treatment of discharged wastes by an increased volume of commercial shipping and pleasure craft in the Chicago area has resulted in greater overall pollution. Those wastes are classified as follows:

1. Wastes of human origin
2. Wastes from ballast and bilge water
3. Compartment washings
4. Garbage
5. Dredged materials
6. Refuse and dunnage
7. Cargo losses
8. Miscellaneous

Pollution problems resulting from the uncontolled discharging of wastes from vessels can be serious, such as they can alter the esthetic value of harbors, bathing beaches and private property; be a health hazard to bathers and water skiers; and be costly and a health hazard to municipal and industrial water supplies.

The increased number of pleasure craft in this area has resulted in greater congestion and pollution in harbors and marinas. Oil, gasoline exhaust wastes, garbage and sewage are the major sources of pollution from pleasure craft.

Most of the pleasure craft in the Chicago area are used from 12 to 16 hours per week and carry an average crew of 4 persons per vessel. The operating season for pleasure boats usually lasts about 17 weeks. There are times during the season when many of the boaters live on their craft when moored in the marinas. The 8,000 pleasure craft having marine toilet facilities can be expected to contribute a domestic sewage equivalent to that from a community of 3,000 persons to the harbors and beaches in Chicago and environs whereas the waste load from commercial vessels using the ports in this area is equivalent to that from a community of 1,700 persons.

Pollution from commercial vessels and pleasure craft is serious since it degrades shoreline property, affects water quality, creates a health hazard, and affects harbor and bathing beach conditions. Although the pollution conditions do not spread over extended areas in open waters, they became significant problems in ports, harbors, and

marinas due to the concentration of boats therein. Further, due to the itinerant nature of boat movements coupled with indiscriminate waste disposal practices, there exists a continuing pollution hazard to water supply intakes.

The pollution problem from commercial craft could be alleviated either by the installation of adequate waste treatment devices, by pumping wastes via a sewer line installed on the dock for ultimate disposal on land, or by the development of strict regulations for the control of sanitation in the various ports in the Chicago area. In respect to pleasure craft, the problem could be alleviated, by intensive research directed toward development of effective treatment devices, educational programs to encourage boaters to use shore facilities and the development of strict regulations for the control of sanitation in marinas.

In the Chicago area, the Interstate Quarantine Regulations prohibit discharges of wastes within 4 miles of the City of Chicago intakes. At all other municipal potable water intakes in the Great Lakes the prohibited area is 3 miles. The control of discharges from the great variety of ocean going ships, lake boats, other commercial craft, and pleasure craft which ply other areas of the Great Lakes is difficult at best. Posting of the regulations, coupled with surveillance limited to the efforts of the Public Health Service, the Coast Guard and possibly the Corps of Engineers, constitute the control measures.

Wastes from Federal Installations

Overall, there are 2173 federal installations located in the Region reported as discharging wastes, although the vast majority are on municipal sewerage systems. Some 216 of these installations discharge treated and untreated wastes into the surface waters of the Region. The Regional Office is actively pursuing a program involving evaluation surveys and reports on this latter group. Also in instances where reports of pollution conditions are received by the Regional Office, technical assistance is given to the installatien to correct the condition and prevent reccurrance.

Included in the 216 mentioned above are 24 federal installations that discharge wastes into the surface waters of Chicago and its environs. Eighteen of these installations, with a total domestic waste volume of 5,569,000 gallons per day, have waste treatment facilities provided. Six installations with a total of 2,980 fallons of wastes per day discharge without treatment into the Chicago Sanitary and Ship Canal, the Little Calumet River and Lake Michigan.

The most significant contributors are the two sewage treatment plants at the Great Lakes Naval Training Center, the plant at Fort Sheridan, the Argonne National Laboratory and the Kankakee and Elwood Units of the Joliet Arsenal. Apart from a potential waste load estimated at 5.0 MGD from an inactive industrial operation at the Kankakee Unit of the Joliet Arsenal, the balance of the federal installations contribute a total of about 20,000 GPD of industrial wastes

to the surface streams of the area. Identification of all 24 installations along with estimates of waste flows to the receiving streams and lakes are listed in Table 14 and located on Figure 14.

# IV WATER-QUALITY IMPROVEMENT MEASURES

It will be apparent from the foregoing description of conditions, that no single panacea will result in the improvements in water quality which the area needs, desires, and - with concerted effort - can achieve. It is possible, however, to define the major elements of the problem, and to suggest those measures on which a concentration of effort may be expected to yield the most immediate and greatest improvement.

In its reports to the Justice Department for the diversion hearings, the Public Health Service made the following recommendations:

"1. No less than secondary treatment should be provided for all sewage being discharged to the Upper Illinois River System and the main stem below Lockport.

2. The Metropolitan Sanitary District should undertake an extensive study to determine the best plan to attain the recommended goal on stream coliform density. The technical practicability of disinfecting the canal at several locations and/or the disinfecting of treatment plant effluents and storm water overflows should be studied.

3. The Metropolitan Sanitary District should continue its present experimental program of artificial reaeration of the river system in order to determine whether it is practical to increase oxygen concentrations by this method under the conditions that prevail.

4. The recently enacted industrial waste ordinance should be reviewed for possible revisions that will encourage industrial practices which minimize the quantity and strength of industrial wastes delivered to the MSD sewer system.

5. The Metropolitan Sanitary District should continue the program for the detection of unknown submerged outfalls, illegal connections to storm sewers, and other types of illicit connections.

6. The use of the canals in the Chicago area for cooling water by air conditioning, thermal power, and industrial installations should be regulated and limited.

7. The MSD and other responsible agencies should increase the emphasis given to research and development programs for improvement of treatment techniques and other measures to protect the quality of receiving waters.

8. The Metropolitan Sanitary District should immediately undertake comprehensive engineering studies to determine the best plan for the separation of storm and sanitary sewers, and the plan should be implemented as it becomes available. Suggested short-term improvements should be made in the meantime.

9. The "water year" for computation of the average allowable diversion should begin on March 1, and should continue for a two-year period if necessary for balancing the water account when circumstances dictate, to foster better utilization of the authorized diversion."

Improvement measures can be conveniently grouped under headings of Exclusion, Collection, Treatment, Dispersal, and Operations.

Exclusion of Wastes at the Source

While it seems certain that waste transport will continue to be one of the uses served by the waters of an area, there are certain substances which should be excluded from sewer systems, and disposed of by other means. Most notable of these is radioactive material, and there seems to be universal agreement that the quantities of such material discharged to streams should be severely limited. Other materials which should be separated (or kept separate) from waste water at the source include the toxic metals, oil, and strong acids or alkalis. In addition, economic considerations can be made to exert

greater influence on the choice of disposal methods by industries. To that end, the Public Health Service has recommended consideration of industrial waste ordinances that base the charges for sewer service on the quantities of wastes received for treatment and disposal. (This is not the current practice of the Metropolitan Sanitary District of Chicago ). The experience of other cities has been cited to show that this practice can result in substantial reduction of waste loads handled by the public disposal facility.

Storm Water Overflow Control

Like many of the older large cities of the country, Chicago today has a sewer system that evolved in response to current practices as time went on rather than being planned in the light of present-day knowledge and attitudes. The collector system of the Metropolitan Sanitary District contains some 350 overflow points, where a part of the mixture of storm water and untreated sewage is spilled locally to the stream system. The continuous effects of these periodic overflows were described earlier in the discussion of the Biochemical Oxygen Demand exerted by sludge deposits.

The task of separating sewers or effecting other control measures in congested areas and high-value districts is a monumental one, and it is not expected to be fully accomplished in a short time. Urban redevelopment affords an opportunity to institute corrective practices. The Public Health Service has recommended that MSD,and others charged

with the responsibility, embark upon a thorough study of ways and means to solve this problem.

It is appropriate to note here an important sidelight of the combined sewer problem. The runoff from rainfall in an urban area is itself a carrier of pollutional materials to streams. The few pilot studies that have been completed to date suggest that this contribution is substantial. Further study of this aspect is needed, and is under way; the need for such study is not, however, considered justification for continuing the practice of deliberately combining storm runoff with large quantities of waste known to be of human fecal origin.

Waste Treatment Techniques and Research

In regard to waste treatment practices, there is need for research to improve the efficacy of treatment, and also for wider and better application of things already known. Modern methods for biological treatment of wastes can do only a part of the job - but they can do that part to a greater degree than is currently being practiced in many places. Reasons may be that plants are too small, are obsolete, are not designed to take full advantage of present technical knowledge, or are not manned by operators trained and motivated to do the best possible job.

Properly designed and operated, treatment plants today should be expected to accomplish, with a high degree of efficiency, the following results: 1) removal of floating matter and suspended solids;

2) stabilization of decomposable organic material, as reflected by satisfaction of biochemical oxygen demand; 3) destruction of pathogens; and 4) provision of dissolved oxygen, to contribute toward the oxygen demand of the continuing reaction as the residue flows downstream. Referring to the third item, the Service has recommended investigation of the feasibility of chlorinating the effluents from municipal waste treatment plants. The major plants in this area (including MSD) do not chlorinate effluents at present.

In the Chicago area and environs, some isolated communities and several industries are still discharging wastes with little or no treatment. These wastes should either be provided with proper treatment at the source, or connected to the central systems.

Research is especially needed to develop techniques for treatment of persistent organic and other synthetic compounds that resist biological degradation, and for the removal of the nutrients that promote aquatic growth and lead to dense algal blooms in streams and lakes. Recognition of the need for research, and support of it, can yield solutions, as demonstrated by recent developments with regard to synthetic detergents.

In addition to treatment at plants, the possibilities for <u>in situ</u> treatment, in the receiving streams and lakes, should be further explored. The Metropolitan Sanitary District is to be commended for its experiments with an in-stream aerator, aimed at increasing the oxygen input to the stream from the air. Although the results to date have not been notably succesful, efforts along this line should be

continued. Other possibilities along this line are in-stream disinfection and better ways to control undesirable aquatic growths. As previously noted, the removal of nutrients, nitrogen and phosphate, from effluents, would help. But nitrogen and phosphate are not the only elements required for over-active aquatic growth. Research effort may disclose some governing element which is present in minute quantities, and is amenable to control.

Dispersal of Residues

In the present state of knowledge, the effluent from municipal and industrial wastes, even after a high degree of treatment, will still degrade the quality of water in receiving streams to such a degree as to be detrimental to many uses, unless sufficient quantities of higher-quality water are made available to dilute the residue and reduce concentrations of pollutional materials both known and unknown in nature. That is why the Public Health Service recommended that the direct diversion from Lake Michigan at Chicago, presently allowed by the Supreme Court, not be reduced. The planning and design of waste collection and treatment systems should give greater attention to strategic location of the outfalls for ultimate disposal. Many treatment plants in the Chicago area discharge to watercourses that have no other flow during dry-weather periods. Master sewerage plans should be prepared for the area. These plans should delineate the areas served, or to be served, by each individual system, and should foster the

combining of small isolated plants into integrated systems as development progresses.

Operations

It goes without saying that the best designed plant will not accomplish its purpose without proper operation. Encouragement and support should be given to the state water pollution control agencies in their efforts to improve training and promote licensing of sewage works operators. Illinois now has mandatory, and Indiana voluntary, licensing procedures.

Monitoring and surveillance are important elements of operation that merit greater attention. The development of remotely-controlled and continuously recording instruments for measuring water quality has made rapid strides in recent years. As an example of operational use of such equipment, dissolved oxygen analyzers should be permanently installed at critical points in the Chicago area stream system. The information thus obtained should be relayed to a control center and there utilized to dispatch flows of allowable diversion from Lake Michigan as needed, for most efficient utilization of the water.

The Metropolitan Sanitary District of Greater Chicago not only exercises authority over its own works, but also has some jurisdiction over the receiving channels. This is a fortunate arrangement, and the District should actively pursue a program of policing to prevent illicit discharges to the waterway, both occasional and continual.

# V - FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS

Forty-two projects in nine counties within the Chicago area in Illinois and Indiana have received construction grants of over $5 million under the Federal Water Pollution Control Act. These grants have supported construction in excess of $19.6 million, for projects serving a population of approximately 490,000. Twenty-seven projects have been completed and placed in operation. The remaining 15 are currently under construction.

Detailed data on the individual projects are listed in Table 15. Figure 15 depicts the geographical location of the various projects.

TABLE 1
MEMBERS OF TECHNICAL COMMITTEE
GREAT LAKES-ILLINOIS RIVER BASINS PROJECT

Mr. Loring F. Oeming
Executive Secretary
State of Michigan
Water Resources Commission
200 Mill Street
Lansing 13, Michigan

Mr. C. W. Klassen
Technical Secretary
State of Illinois
Sanitary Water Board
Springfield, Illinois

Mr. Norval E. Anderson
Chief Engineer
The Metropolitan Sanitary District
of Greater Chicago
100 East Erie Street
Chicago 11, Illinois

Dr. C. S. Boruff
Technical Director
Hiram Walker & Sons, Inc.
Peoria 1, Illinois

Mr. R. A. Hirshfield
General Hydraulic Engineer
Commonwealth Edison Company
Chicago 90, Illinois

Mr. B. A. Poole
Technical Secretary
Stream Pollution Control Board
1330 W. Michigan Street
Indianapolis 7, Indiana

Mr. P. J. Marschall
Vice President in charge of
Engineering
Abbott Laboratories
14th and Sheridan
North Chicago, Illinois

Mr. C. J. McLean
c/o Northeastern Illinois Metropolitan
Area Planning Commission
72 West Adams Street
Chicago 3, Illinois

Mr. O. J. Muegge
State Sanitary Engineer
The State of Wisconsin
Board of Health
State Office Building
Madison 2, Wisconsin

Mr. Ross L. Harbaugh
Superintendent, Chemical Departm
Inland Steel Company
Indiana Harbor Works
East Chicago, Indiana

Mr. A. F. Endres
Manager
Whiting Refinery
American Oil Company
2400 New York Avenue
Whiting, Indiana

Mr. Burton H. Atwood
National Treasurer
Izaak Walton League
Crystal Lake, Illinois

Mr. Horace R. Frye
Superintendent, Water & Sewer Dept.
City of Evanston
Evanston, Illinois

Mr. Edward C. Logelin
Vice President
U. S. Steel Corporation
208 S. LaSalle Street
Chicago 90, Illinois

Mr. H. H. Gerstein
Chief Water Engineer, Bureau of
Water
Department of Water and Sewers
City of Chicago
Chicago 2, Illinois

TABLE 2
SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
NORTH BRANCH CHICAGO RIVER SUBBASIN
SUBBASIN #1, 325.6 MILES ABOVE MOUTH OF ILLINOIS RIVER

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| COOK COUNTY - ILLINOIS | | | | | | |
| North Side Plant (MSD)(d) | N. Shore Chnl. | 8-3 | Sec. | 1,231,000 | 1,086,000 | 48,400 |
| Smaller Sources - Four | | | All Sec. | 1,100 | 1,100 | 200 |
| SUBTOTALS | | | | 1,232,100 | 1,087,100 | 48,600 |
| LAKE COUNTY - ILLINOIS | | | | | | |
| Park City Trailer Park | Skokie Creek | 23-21 | Pri.(a) | 1,200 | 1,200 | 800 |
| Great Lakes Naval Tr. Sta. Green Bay Plant | Skokie Creek | 23-17 | Sec. | 7,500 | 8,400 | 800 |
| North Shore San. District Clavey Road Plant (b) | Skokie Creek | 23-7 | Sec. | 10,000 | 11,000 | 1,500 |
| Deerfield (c) | Union Dr. Dth. | 20-11 | Sec. | 12,000 | 19,300 | 3,700 |
| Smaller Sources - Three | | | All Sec. | 600 | 600 | 100 |
| SUBTOTALS | | | | 31,300 | 40,500 | 6,900 |
| TOTALS FOR SUBBASIN | | | | 1,263,400 | 1,127,600 | 55,500 |

(a) Single and communal septic tanks partly discharging to Creek.
(b) Serves parts of Highland Park, Highwood and scattered unincorporated areas and commercial establishments.
(c) Includes contribution from Bannockburn.
(d) Serves Evanston, Glencoe, Glen Oak Acres S.D., Glenview, Golf, Kenilworth, Lincolnwood, Morton Grove, Niles, Northbrook, Northfield, Northfield Woods, Skokie, Wilmette, Winnetka, Canfield community.

TABLE 3a

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
ILLINOIS RIVER SYSTEM & MINOR TRIBUTARIES
SUBBASIN #2, LAKE MICHIGAN TO KANKAKEE RIVER

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Ill. River (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) | |
|---|---|---|---|---|---|---|---|
| COOK COUNTY - ILLINOIS | | | | | | | |
| WSW Plant (MSD) (a) | Ill. Waterway | 315.8 | Sec. | 2,917,200 | 6,320,000 | 795,000 | (c) |
| Lemont | I & M Canal | 300.5 | Sec. (b) | 3,400 | 3,400 | 500 | E |
| Smaller Sources - Five | | | All Sec. | 1,500 | 1,100 | 200 | |
| SUBTOTALS | | | | 2,922,100 | 6,324,500 | 651,700 | |
| WILL COUNTY - ILLINOIS | | | | | | | |
| Frankfort | Br. Hickory Cr. | 301.9 | Sec. | 1,100 | 1,100 | 200 | |
| Lockport | Deep Run Cr. | 292.5 | Pri. | 7,500 | 5,000 | 2,600 | |
| Mokena | Br. Marley Cr. | 300.4 | Sec. | 1,300 | 1,300 | 300 | |
| Bonnie Brae Subdivision | Big Run Cr. | 294.6 | Sec. | 1,400 | 1,400 | 300 | |
| New Lenox | Hickory Cr. | 294.5 | Sec. | 1,700 | 1,700 | 300 | |
| Joliet | Spg. & Hickory Cr. | 286.5-290.0 | Pri. & None | 71,600 | 71,600 | 50,100 | |
| Joliet Fringe-Urban-Unincorp. | I & M, Hickory Cr. | 286-290 | Minor | 6,000 | 6,000 | 6,100 | |
| Smaller Sources - Eight | | | 5-Sec. | 1,600 | 1,400 | 300 | |
| | | | 2-Pri. | 1,300 | 700 | 400 | |
| | | | 1-None | 900 | 900 | 900 | |
| SUBTOTALS | | | | 94,400 | 91,100 | 61,500 | |
| TOTALS FOR SUBBASIN | | | | 3,016,500 | 6,415,600 | 857,200 | |

Footnotes on following page

TABLE 3b
ILLINOIS RIVER SYSTEM & MINOR TRIBUTARIES, SUBBASIN #2

(a) Serves Arlington Heights, Bellwood, Berkeley, Berwyn, Brickman Manor, Bridgeview, Broadview, Brookfield, Stickney S.D., Cicero, Des Plaines, Elk Grove, Elmwood Park, Forest Park, Forest View, Franklin Park, Grandview (Oak Lawn), Harwood Heights, Highland (La Grange), Hillside, Hometown, La Grange, La Grange Park, Lyons, Manor Heights S.D., Maywood, McCook, Melrose Park, Mt. Prospect, Norridge, Northlake, North Riverside, Oak Park, Orchard Place S.D., Palatine, Palatine Heights, Park Ridge, Plum Grove Estates, Prospect Meadows S.D., Riverside, River Grove, River Forest, Rolling Meadows, Rosemont, Schiller Park, South Stickney S.D., Stickney, Stone Park, Summit, Westchester, Western Springs, Willow Springs, Bedford Park, Countryside S.D. (Edgewood & Edgewood Park), Algonquin Road, Blackhawk Subdivision (Palatine), Bluett, Cumberland Heights, Greenwood Gardens (Des Plaines Subdivision), Gunnison Improvement Club and Hodgkins.

(b) New Plant placed in operation; no analytical data available.

(c) Includes 144,000 P.E. from malfunctioning sewer relief.

TABLE 4a

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
DES PLAINES RIVER SUBBASIN
SUBBASIN #4, 290.0 MILES ABOVE MOUTH OF ILLINOIS RIVER

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| LAKE COUNTY - ILLINOIS | | | | | | |
| Gray's Lake | Mill Creek | 81-15 | Sec. | 3,800 | 2,700 | 200 |
| Mundelein (a) | Hawthorne Creek | 61-7-2 | Sec. | 10,500 | 14,900 | 2,500 |
| Libertyville, No. Plant | Des Plaines R. | 69 | Sec. | 4,100 | 2,700 | 200 |
| Libertyville, So. Plant | Des Plaines R. | 68 | Sec. | 4,400 | 3,900 | 600 |
| Smaller Sources - Twelve | | | 10-Sec. | 1,500 | 1,500 | 200 |
| | | | 1-Pri. | 200 | 200 | 100 |
| | | | 1-None | 100 | 100 | 100 |
| SUBTOTALS | | | | 24,600 | 26,000 | 3,900 |
| COOK COUNTY - ILLINOIS | | | | | | |
| Hoffman Estates | Dth. to Salt Cr. | 27-31-6 | Sec. | 8,800 | 10,200 | 1,500 |
| Buffalo Gr. Plant (MSD) (b) | Buffalo Cr. | 54-3-2 | Sec. | 3,000 | 3,200 | 500 |
| Wheeling Plant (MSD) | Wheeling Dr. Dth. | 54-2 | Sec. | 8,400 | 8,600 | 1,100 |
| Edgewood Park Subd. | Dth. to Des Plns.R. | 23-2 | Sec. | 1,200 | 1,200 | 100 |
| Smaller Sources - 28 | | | All Sec. | 5,900 | 5,700 | 1,000 |
| SUBTOTALS | | | | 27,300 | 28,900 | 4,200 |

TABLE 4b

DES PLAINES RIVER SUBBASIN

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| DU PAGE COUNTY - ILLINOIS | | | | | | |
| Bensenville | Salt Creek | 27-24-11 | Sec. | 8,600 | 8,700 | 2,500 |
| Roselle | Meecham Creek | 27-27 | Sec. | 3,600 | 4,800 | 1,400 |
| Suncrest Highland | Meecham Creek | 27-5 | Sec. | 1,300 | 1,300 | 400 |
| Itasca | Itasca Creek | 27-27-2 | Sec. | 3,500 | 3,500 | 500 |
| Salt Creek S.D. (c) | Salt Creek | 27-26 | Sec. | 19,000 | 37,500 | 3,300 |
| Wood Dale | Salt Creek | 27-25 | Sec. | 2,500 | 2,500 | 400 |
| Hinsdale S.D. (d) | Flag Creek | 46-6 | Sec. | 24,000 | 29,800 | 4,000 |
| Addison | Salt Creek | 27-23 | Sec. | 6,700 | 5,300 | 1,200 |
| Elmhurst | Salt Creek | 27-18 | Sec. | 36,900 | 28,200 | 13,000 |
| Oak Brook | Salt Creek | 27-15 | Sec. | 1,400 | 1,400 | 200 |
| Argonne Nat'l Lab. | Sawmill Creek | 13-1 | Ter. | 1,400 | 1,400 | 100 |
| Smaller Sources - 20 | | | All Sec. | 4,200 | 3,200 | 500 |
| SUBTOTALS | | | | 113,100 | 127,600 | 27,500 |
| WILL COUNTY - ILLINOIS | | | | | | |
| Hampton Park Subd. | Des Plaines R. | 7 | Sec. | 5,000 | 5,000 | 500 |
| Smaller Sources - Two | | | 1-Sec. | 200 | 200 | 200 |
| | | | 1-None (e) | 900 | 300 | 100 |
| SUBTOTALS | | | | 6,100 | 5,500 | 800 |
| TOTALS FOR SUBBASIN | | | | 171,100 | 188,000 | 36,400 |

(a) Includes contribution from Bannockburn.
(b) Serves Buffalo Grove and various subdivisions and unincorporated areas.
(c) Serves Ville Park
(d) Serves Hinsdale, Clarendon Hills, part of Westmont and several unincorporated areas.
(e) To be connected to Joliet 'n 1961.

TABLE 5a

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM

DU PAGE RIVER SUBBASIN

SUBBASIN #5, 277.1 MILES ABOVE MOUTH OF ILLINOIS RIVER

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| COOK COUNTY - ILLINOIS | | | | | | |
| Weathersfield Subdivision (a) | Dth. to W. Br. Du Page R. | 61 | Sec. | 1,100 | 1,100 | 200 |
| Bartlett Plant (MSD) | Dth. to W. Br. Du Page R. | 54-2 | Sec. | 1,700 | 2,800 | 500 |
| Smaller Sources - One | | | Sec. | 500 | 500 | 100 |
| SUBTOTALS | | | | 3,300 | 4,400 | 800 |
| DU PAGE COUNTY - ILLINOIS | | | | | | |
| Lombard | E. Br. DuP. R. | 28-19 | Sec. | 21,600 | 9,100 | 2,600 |
| West Chicago | W. Br. DuP. R. | 45 | Sec. | 6,800 | 9,300 | 500 |
| Winfield | W. Br. DuP. R. | 45 | Sec. | 1,600 | 1,600 | 300 |
| Downers Grove | St. Josephs Cr. | 28-R17-3 | Sec. | 20,000 | 17,000 | 3,300 |
| Glen Ellyn | E. Br. DuP R. | 28-R16 | Sec. | 15,900 | 6,300 | 1,900 |
| Wheaton SD | W. Br. DuP. R. | 39-3 | Sec. | 23,700 | 21,200 | 5,300 |
| Oak View Subd. | E. Br. DuP. R. | 28-11 | Sec. | 1,300 | 1,400 | 500 |
| Naperville | W. Br. DuP. R. | 33 | Sec | 13,500 | 18,900 | 1,800 |
| Smaller Sources - Thirteen | | | All Sec. | 3,200 | 3,200 | 600 |
| SUBTOTALS | | | | 107,600 | 88,000 | 16,800 |
| WILL COUNTY - ILLINOIS | | | | | | |
| Plainfield | Du Page R | 19 | Sec. | 1,600 | 1,600 | 500 |
| Crest Hill City (b) | Rock Run Cr. | 1-5-10 | Sec. | 1,200 | 1,200 | 200 |
| Rockdale | I & M Canal | 1-9 | Sec. | 1,300 | 1,100 | 200 |
| Smaller Sources - Two | | | 1-Sec. 1-None | 500 | 400 | 100 |
| SUBTOTALS | | | | 5,000 | 4,700 | 1,400 |
| TOTALS FOR SUBBASIN | | | | 115,900 | 97,100 | 19,000 |

TABLE 5b
DU PAGE RIVER SUBBASIN

(a) Serves Shaumberg and Shaumberg Center, except Hoffman Estates.

(b) Incorporated 1960 absorbing Lidice Subdivision. Other absorbed subdivisions are on septic tanks or connected to Joliet sewage treatment works.

TABLE 6a

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
CALUMET-SAG CHANNEL AND TRIBUTARIES
SUBBASIN #3, 303.4 MILES ABOVE MOUTH OF ILLINOIS RIVER[a]

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharge (7) |
|---|---|---|---|---|---|---|
| COOK COUNTY - ILLINOIS | | | | | | |
| Sauk Village & Indian Hill | Lansing Dr. Dth. | 16-9-5-6-7 | Sec. | 2,600 | 2,100 | 300 |
| Southdale Subdivision | Lansing Dr. Dth. | 16-9-5-6-6 | Sec. | 1,200 | 800 | 100 |
| Matteson | Butterfield Cr. | 16-9-8-8-1 | Sec. | 3,000 | 3,000 | 200 |
| East Chicago Heights | Deer Creek | 16-9-8-4 | Sec. | 3,300 | 3,300 | 500 |
| Bloom Township San. Dist.[b] | Thorn Creek | 16-9-11 | Sec. | 68,000 | 77,000 | 16,900 |
| Flossmoor | Butterfield Cr. | 16-9-8-3 | Sec. | 4,600 | 4,600 | 700 |
| Homewood | Butterfield Cr. | 16-9-8-2 | Sec. | 14,000 | 15,000 | 1,400 |
| Washington Pk. Race Track | Dth. to Thorn Cr. | 16-9-7-1 | Sec. | 20,000 | 1,000 | 100 |
| Thornton | Thorn Cr. | 16-9-4 | Sec. | 2,900 | 2,900 | 400 |
| Country Club Hills Subdiv. | Cal. Un. Dr. Dth. | 16-6-7 | Sec. | 3,400 | 3,400 | 500 |
| Lansing | Little Cal. R. | 16-12 | Sec. | 18,000 | 18,000 | 3,600 |
| Sundale Hills Subdiv. | Midlothian Cr. | 16-1-10 | Sec. | 1,400 | 1,900 | 200 |
| Park Side Subdiv.[c] | Midlothian Cr. | 16-1-9 | None[c] | None[c] | 2,800 | 2,800 |
| Hazel Crest | Cal. Un. Dr. Dth. | 16-6-3-1 | Sec. | 6,200 | 6,200 | 600 |
| Fernway Subdiv. | Tinley Cr. | 11-8 | Sec. | 1,300 | 1,400 | 100 |
| Calumet Plant (MSD)[d] | Cal-Sag Channel | 18 | Sec. | 602,400 | 624,000 | 74,000 |
| Ridgeland Water Svcs. Co.[e] | Cal-Sag Channel | 11 | Sec. | 1,200 | 1,200 | 100 |
| Orland Park Plant (MSD) | McG. Sl. toMill Cr. | 5-5 | Sec. | 2,600 | 1,100 | 100 |
| Worth-Ridgeland Plt. (MSD) | Cal-Sag Channel | 9 | Pri. | 3,800 | 3,800 | 3,800 |
| Worth-Oketo Ave. Plt. (MSD) | Cal-Sag Channel | 8 | Pri. | 4,300 | 4,300 | 2,800 |
| Smaller Sources - 29 | | | All Sec. | 7,000 | 7,500 | 800 |
| SUBTOTALS | | | | 771,200 | 785,300 | 110,000 |
| WILL COUNTY - ILLINOIS | | | | | | |
| Crete | Dth. to Deer Cr. | 16-9-8-9-1 | Sec. | 3,500 | 3,500 | 1,000 |
| Steger[f] | Third Creek | 16-9-10-5 | Sec. | 6,400 | 6,400 | 1,300 |
| Smaller Sources - One | | | Minor | 300 | 300 | 300 |
| SUBTOTALS | | | | 10,200 | 10,200 | 2,600 |

TABLE 6b

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
CALUMET-SAG CHANNEL AND TRIBUTARIES
SUBBASIN #3, 303.4 MILES ABOVE MOUTH OF ILLINOIS RIVER(a)

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| LAKE COUNTY - INDIANA | | | | | | |
| Black Oak-Ross(g) | Cady Marsh-Hart | 16-22-1-6 | Minor | 17,000 | 17,000 | 15,000E |
| Schererville | Cady Marsh-Hart | 16-16-5 | Minor(k) | 1,250 | 1,250E | 1,000E |
| Dyer | Hart Ditch | 16-16-4 | Minor(k) | 3,600 | 3,600 | 3,000E |
| Griffith (part) | Cady Marsh-Hart | 16-16-1-3 | Minor(l) | 7,100 | 7,100 | 5,700E |
| Highland (part)(h) | Little Cal. R. | 22-5 | None | 5,430 | 5,430E | 4,880E |
| Munster (part)(i) | Little Cal. R. | 16-15 | None | 5,150 | 5,150E | 4,500E |
| East Chicago | Grand Cal. R. | 22-6 | Sec. | 64,800 | 59,400 | 9,640 |
| Hammond(j) | Grand Cal. R. | 22-5 | Sec. | 132,000 | 266,000 | 25,400 |
| Smaller Sources - Two | | | All Sec. | 600 | 600 | 200 |
| One | | | Minor | 1,000 | 650E | 580E |
| SUBTOTALS | | | | 237,300 | 367,780 | 69,900 |
| TOTALS FOR SUBBASIN | | | | 1,018,700 | 1,163,280 | 182,500 |

(a) Includes Indiana sources discharging west of weak divides on the Grand Calumet River just west of Indiana Harbor Canal, Mile 28.1, and on Little Calumet River at Mile 39.9. Divides may move easterly or westerly somewhat depending on rains, floods and lake levels. Not included is Gary Main Plant discharging about 18,900 population equivalent at Mile 36.1 to Grand Calumet River, flow of which may divide at Indiana Harbor Canal at times.

(b) Serves Park Forest, Chicago Heights, South Chicago Heights.

(c) Now being sewered for a proposed treatment plant, now partly sewered, septic tanks, etc., with large percentage discharging to Midlothian Creek.

(d) Serves Alsip, Blue Crest, Blue Island, Burnham, Calumet City, Calumet Park, Canterbury Gardens, Chicago Ridge, Dixmoor, Dolton, Evergreen Park, Garden Homes, Harvey, Hickory Hills, Markham, Merrionette Park, Midlothian, Oak Forest, Oak Lawn, Phoenix, Posen, Riverdale, Robbins, South Holland, Keystone Additions, Manor Heights Subdivision, Martin Roberts Subdivision (Oaklawn), and South Stickney.

(e) Sewers and treatment plant serve Crestwood.

(f) The population of Steger is divided 4,300 Will County and 2,100 Cook County.

TABLE 6c
CALUMET-SAG CHANNEL AND TRIBUTARIES

(g) About 17,000 in Cal-Sag basin; 6,000 in LM-16 basin. Due to local weather conditions and dredging operations, 0-90% of this area may drain eastward into Lake Michigan. Many septic tank systems operating improperly or are inadequate.
(h) Planning for interceptor to take 100% of wastes to Hammond SD.
(i) Plans approved for connection to Hammond interceptor.
(j) Includes contributions from Whiting, Munster (part) and Highland (part). Improvements under construction to raise capacity to 36 MGD.
(k) Variously raw or/and individual septic tank effluents discharged to storm sewers, tile outfalls to ditches.
(l) Community sewers receive individual septic tank discharges. Other part to Lake Michigan tributaries.

TABLE 7a
SOURCES OF SEWAGE POLLUTION - LAKE MICHIGAN
SUBBASIN No. LM16 - CALUMET RIVER COMPLEX

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles From Lake Michigan (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| LAKE COUNTY - INDIANA | | | | | | |
| Crown Point | Beaver Dam Ditch | 37 | Sec. | 8,000 | 3,320 | 500 |
| Griffith (Part) | Turkey Cr. | 18-8 | Minor | 2,400 | 2,400 E | 1,900 E |
| St. John Twp. Uninc. | Turkey Cr. | 18-7 | Minor | 3,300(a) | 650 E | 650 E |
| Independence Hill | Turkey Cr. | 18-6 | Minor | 1,825(b) | X | X |
| Lincoln Gardens | Turkey Cr. | 18-6 | Sec. | 1,000 | 1,000 E | 15 E |
| Ross Twp. Uninc. Area | Turkey Cr. | 18-5 | Minor | 14,855(c) | 3,000 E | 3,000 E |
| Hobart Twp. Uninc. Urbanized Area | Deep R. | 18 | Minor | 8,920(d) | 1,800 E | 1,800 E |
| Hobart (Part) | Deep R. | 16 | Sec. | 14,000 | 6,000(e) | 3,725 |
| Hobart (Part) | Deep R. | 16 | Minor | 4,680 | 4,680 E | 4,000 E |
| Black Oak-Ross(f) | Little Cal. R. | 8-6 | Minor | 6,000 | 6,000 E | 5,280 E |
| Gary SD Main Plant(g) | Grand Cal. R. | 4-7 | Sec. | 174,230 | 310,000 | 18,900 |
| East Chicago | Grand Cal. R. | 4 | Sec. | 64,800 | 59,400 | 9,640(h) |
| Smaller Sources - Ten | | | 9 Sec. | 2,120 | 2,120 | 400 |
| | | | 1 Minor | 600 | 300 | 265 |
| SUBTOTALS | | | | 306,730 | 400,670 | 50,075 |
| PORTER COUNTY - INDIANA | | | | | | |
| Chesterton(i) | Little Cal. R. | 1-7 | Minor | 4,000 | 4,000 E | 4,000 E |
| Porter(j) | Little Cal. R. | 1-6 | Minor | 1,200 | 1,200 | 1,020 E |
| Valparaiso | Salt Cr. | 1-1-16 | Sec. | 15,000 | 13,450 | 460 |
| Smaller Sources - Three | | | All Sec. | 740 | 740 | 110 E |
| SUBTOTALS | | | | 20,940 | 19,390 | 5,590 |
| TOTALS FOR SUBBASIN | | | | 327,670 | 420,060 | 55,665 |

Footnotes on following page

TABLE 7b
LAKE MICHIGAN SUBBASIN NO. LM 16

(a) 1,000 in Calumet-Sag basin. Remainder are served by septic tank systems with some systems operating improperly. An undetermined amount reaches Turkey Cr.

(b) Served by septic tank systems with unknown amount discharged to Turkey Cr.

(c) Gary SD sewers serve 1,400. Remainder are served by septic tank systems with subsurface discharge. An undetermined amount reaches Turkey Cr.

(d) Gary SD sewers serve several hundred people. The remainder are served by septic tank systems with subsurface discharge. An undetermined amount reaches Turkey Cr.

(e) Secondary treatment began March 1962.

(f) About 17,000 in Cal-Sag basin; 6,000 in LM16. Due to local weather conditions and dredging operations, 0-90% of this area may drain eastward into Lake Michigan. Many septic tank systems operating improperly or systems are inadequate.

(g) Gary Main Plant serves all of Gary except the Miller area. Outside Gary, a large shopping center and nearby subdivisions are also served by the main plant sewers. These include: Meadowland Estates - 700; Meadowdale - 700; and several small subdivisions. Altogether, about 1,700 people outside Gary are served by the Gary SD Main Plant sewers. An undetermined percentage of the Gary Main Plant discharged waste goes into Lake Michigan.

(h) An undetermined percentage of the discharged waste goes into Lake Michigan.

(i) Sewage treatment plant under construction.

(j) Engineer is preparing plans.

TABLE 8
SOURCES OF SEWAGE POLLUTION - LAKE MICHIGAN BASIN
SUBBASIN NO. 54-55 WAUKEGAN - HIGHLAND PARK AREA

| Community, Sewer or Sanitary District, Institution | Receiving Stream (direct) | Miles Above Mouth of Branch | Treatment | Population Connected to Sewers | Sewered Population Equivalent B.O.D. | |
|---|---|---|---|---|---|---|
| | | | | | Untreated | Discharged |
| Fort Sheridan | L. Michigan | 0 | Second | 5,000 | 4,500 | 475 |
| Great Lakes Naval Training Center (Main Plant | L. Michigan | 0 | Second | 31,500 | 38,400 | 3,280 |
| North Shore Sanitary District Cary Avenue Plant (Part of Highland Park) | L. Michigan | 0 | Primary | 7,125 | 4,480 | 2,380 |
| North Shore Sanitary District Lake Bluff Plant (Lake Bluff) | L. Michigan | 0 | Primary | 3,400 | 2,300 | 1,360 |
| North Shore Sanitary District Lake Forest Plant (Lake Forest) | L. Michigan | 0 | Primary | 10,687 | 5,740 | 3,100 |
| North Shore Sanitary District North Chicago Plant (North Chicago) | L. Michigan | 0 | Secondary | 34,400 | 34,400 | 5,370 |
| North Shore Sanitary District Park Avenue Plant (Part of Highland Pk.) | L. Michigan | 0 | Primary | 5,125 | 7,520 | 4,020 |
| North Shore Sanitary District (Ravine Avenue Plant) (Part of Highland Pk.) | L. Michigan | 0 | Primary | 2,500 | 2,560 | 1,260 |
| North Shore Sanitary District Waukegan Plant (Waukegan) (Winthrop Harbor) (Zion) (Park City) (Illinois Beach State Park) | L. Michigan | 0 | Secondary | 74,500 | 108,000 | 5,720 |
| | | | Subbasins Totals | 174,237 | 207,900 | 26,965 |

TABLE 9a

SOURCES OF SEWAGE POLLUTION - ILLINOIS RIVER SYSTEM--MAINSTEM
FOX RIVER SUBBASIN
SUBBASIN #7, 239.7 MILES ABOVE MOUTH OF ILLINOIS RIVER
(ILLINOIS SOURCES ONLY)

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewerd Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| DE KALB COUNTY - ILLINOIS | | | | | | |
| Sandwich | Little Rock Cr. | 31-3-1 | Sec. | 3,020 | 3,020 | 455 E |
| Smaller Sources - Three | | | 1-Minor(1) | 899 | 899 | 800 |
| | | | 2-Sec. | 1,415 | 1,415 | 400 |
| SUBTOTALS | | | | 5,334 | 5,334 | 1,655 |
| KANE COUNTY - ILLINOIS | | | | | | |
| Carpentersville | Fox R. | 77 | Sec. | 2,000 | 2,000 E | 400 |
| Carpentersville (Meadowdale Subd.) | Fox R. | 77 | Sec. | 15,425 | 15,425 | 2,314 |
| E. Dundee | Fox R. | 76 | Sec. | 1,800 | 2,475 | 197 |
| W. Dundee | Fox R. | 76 | Sec. | 2,450 | 2,130 E | 213 E |
| Elgin S.D. | Fox R. | 73 | Sec. | 43,560 | 33,164 | 20,236 |
| Elburn | Big Rock Cr. | 36-26 | Sec. | 1,100 | 950 E | 143 E |
| Elgin State Hospital | Fox R. | 69 | Sec. | 7,200 | 15,737 | 1,078 |
| St. Charles | Fox R. | 58 | Sec. | 6,709 | 6,700 | 1,000 E |
| Batavia | Fox R. | 55 | Sec. | 7,030 | 19,000 | 1,890 |
| Geneva | Fox R. | 51 | Sec. | 7,200 | 8,694 | 432 |
| Aurora S.D. | Fox R. | 49 | Sec. | 78,000 | 48,560 | 6,377 |
| Smaller Sources - Eleven | | | 1-Minor | 940 | 940 | 840 |
| | | | 10-Sec. | 3,448 | 2,976 | 1,368 |
| SUBTOTALS | | | | 176,862 | 145,640 | 36,488 |
| KENDALL COUNTY - ILLINOIS | | | | | | |
| Oswego | Fox R. | 43 | Sec. | 1,220 | 1,220 | 185 |
| Yorkville (Bristol S.D.) | Blackberry Cr. | 36 | Sec. | 1,170 | 1,170 | 175 |
| Plano | Big Rock Cr. | 31-3 | Sec. | 2,150 | 2,150 | 320 |
| SUBTOTALS | | | | 4,540 | 4,540 | 680 |

TABLE 9b
FOX RIVER SUBBASIN

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| LAKE COUNTY - ILLINOIS | | | | | | |
| Lake Villa | Eagle Cr. | 108-4-4 | Sec. | 1,000 | 1,100 | 165 |
| Antioch | Sequoit Cr. | 110-5 | Sec. | 2,200 | 1,529 | 133 |
| Round Lake S.D. | Squaw Cr. | 108-4 | Sec. | 6,500 | 5,070 | 650 |
| Fox Lake Village | Pistakee Lake | 107 | Sec. | 4,100 | 4,100 | 820 E |
| Wauconda | Slocum Lake | 94-4 | Sec. | 3,300 | 3,300 | 330 E |
| Barrington Village (Part) | Flint Cr. | 88-1-7 | Sec. | 5,413 | 7,277 | 597 |
| Lake Zurich | Fox R. | 88-5 | Sec. | 3,460 | 3,460 | 519 E |
| Smaller Sources - Six | | | 1-Minor | 282 | 280 | 240 |
| | | | 5-Sec. | 1,188 | 1,188 | 145 |
| SUBTOTALS | | | | 27,443 | 27,304 | 3,599 |
| LA SALLE COUNTY - ILLINOIS | | | | | | |
| Earlville | Indiana Cr. | 9-18 | Sec. | 1,210 | 1,210 | 180 |
| Ottawa | Illinois R.-At Mouth of Fox R. | | Pri. | 18,000 | 18,000 | 11,700 |
| Smaller Sources - Two | | | 1-Minor | 642 | 642 | 540 |
| | | | 1-Sec. | 475 | 600 | 90 |
| SUBTOTALS | | | | 20,327 | 20,452 | 12,510 |
| LEE COUNTY - ILLINOIS | | | | | | |
| Smaller Sources - One | | | Sec. | 300 | 300 | 30 |
| SUBTOTALS | | | | 300 | 300 | 30 |
| MC HENRY COUNTY - ILLINOIS | | | | | | |
| Woodstock | W. Br. Nippersink Cr. | 107-18-7 | Sec. | 9,000 | 9,000 | 1,350 E |
| Crystal Lake (Old Plant) | Crystal Lake | 96-6-L10 | Sec. | | | |
| Crystal Lake (New Plant) | Crystal Lake | 96-6 | Sec. | 8,000(2) | 8,560(2) | 642(2) |
| McHenry | Fox R. | 101 | Sec. | 4,000 | 6,000 E | 360 E |

TABLE 9c

FOX RIVER SUBBASIN

| Community, Sewer or Sanitary District, Institution (1) | Receiving Stream (Direct) (2) | Miles Above Mouth of Subbasin (3) | Treatment (4) | Estimated Population Connected to Sewers (5) | Estimated Sewered Population Equivalent (BOD Basis) Untreated (6) | Discharged (7) |
|---|---|---|---|---|---|---|
| MC HENRY COUNTY - ILLINOIS (Cont'd) | | | | | | |
| Fox River Grove | Fox R. | 87 | Sec. | 1,200 | 2,150 E | 430 E |
| Cary | Fox R. | 85 | Sec. | 2,200 | 950 E | 190 E |
| Algonquin | Fox R. | 82 | Sec. | 1,200 | 1,200 | 180 |
| Smaller Sources - Two | | | All Sec. | 1,545 | 7,480 | 1,497 |
| SUBTOTALS | | | | 27,145 | 35,340 | 4,649 |
| TOTALS FOR SUBBASIN | | | | 261,951 | 238,910 | 59,611 |

(1) Minor treatment indicates Home Septic Tanks with effluent to community sewer systems or other channels that discharge directly into the watercourse.

(2) Totals for both plants.

TABLE 10a

INDUSTRIAL WASTE INVENTORY
ILLINOIS RIVER SYSTEM

| Industry | Location | Classification | Map Location Code | Effluent MGD | P.E.(1) (5-day B.O.D. | Treatment |
|---|---|---|---|---|---|---|
| | | NORTH BRANCH CHICAGO RIVER | | | | |
| City of Chicago-Medill Incinerator | Chicago, Ill. | Garbage Incinerator | N-1 | 0.42 | 5,200 | Settling |
| Procter and Gamble Mfg. Co. | " | Food & Soap | N-2 | 17.50 | 1,200 | Grease Separation |
| Weil and Eisendrath Co. | " | Leather | N-3 | 0.11 | 2,100(2) | None |
| | | (Paper, Chemical, | Nine | 0.72 | 1,500 | Unknown |
| | | (Metal Fabrication, | Other | | | |
| | | (Plating | Plants | | | |
| SUBTOTAL | | | | 18.75 | 10,000 | |
| | | ILLINOIS RIVER SYSTEM & MINOR TRIBUTARIES LAKE MICHIGAN TO KANKAKEE RIVER | | | | |
| Sucrest Sugar Corp. | Chicago, Ill. | Food | I-1 | 9. | 3,600(2) | Unknown |
| Chicago Curled Hair Co. | " | Fur & Hair | I-2 | 0.18 | 7,000 | None |
| American Sugar Refining Co. | " | Food | I-3 | 0.40 | 20,000(2) | Unknown |
| Cities Service Oil Co. | " | Oil & Grease Mfg | I-4 | 0.17 | 1,600 | Oil Separation. |
| | Summit, Ill. | (Metal Fabrication, | Eighteen Plants | | | (Grease (separation |
| | | (Metal Finishing, | I-6 | | | (& Oil Se- |
| | | (Food, Chemical, | | 4.95 | 29,000(4) | (paration |
| | | (Oil and Grease Mfg. | | | | (Settling (Chemical |
| Texaco, Inc. | Lockport, Ill. | Refinery | I-7 | 50. | 40,000(5) | (Oil Separation & Lagooning) |

TABLE 10b

INDUSTRIAL WASTE INVENTORY
ILLINOIS RIVER SYSTEM

| Industry | Location | Classification | Map Location Code | Effluent MGD | P.E.(1) (5-day B.O.D.) | Treatment |
|---|---|---|---|---|---|---|
| Ruberoid Co. | Joliet, Ill. | Paper | I-8 | 3. | 16,000 | Screening |
| Pure Oil Co. | Lockport, Ill. | Refinery | I-9 | 68. | 25,000 (5) | Oil Separation |
| American Steel & Wire Co. | Joliet, Ill. | Steel Mfg. | I-10 | 21. | 1,000 (5) | Settling & By-Product Recovery |
| American Institute of Laundering | Joliet, Ill. | Laundering | I-11 | 0.12 | 2,000 | Settling |
| Caterpillar Tractor Co. | Joliet, Ill. | Machinery Mfg. | I-12 | 0.80 | 1,000 (5) | Oil Separation |
| Amoco Chemicals Corp. | " | Chemical | I-13 | 0.65 | 92,500 | " " |
| | " | (Chemical, Food, (Steel Mfg. & Metal (Finishing) | Twelve Other Plants | 11.38 | 4,400 (5) | Unknown |
| SUBTOTAL | | | | 169.65 | 243,100 | |
| | | CALUMET-SAG CHANNEL AND TRIBUTARIES | | | | |
| Interlake Iron Corp. | Chicago, Ill. | Iron, Steel, &Coke | C-1 | 37. | 19,200(2) | Settling & Oil Separation. |
| Republic Steel Corp. | " | Iron, Steel, & Coke | C-2 | 85. | 10,000(2) | " " |
| Lever Brothers MfgCo. | Hammond, Ind. | Soap & Food | C-3 | 10. | 18,000 | Grease & Oil Separation. |
| Allied Chemical Co. | Chicago, Ill. | Chemical | C-4 | 4. | 3,200(2) | None |
| Cargill Inc. | " | Food | C-5 | 0.40 | 8,700 | None |
| Ford Motor Co. | " | Automobile Assembly | C-6 | 0.50 | 3,000 | Filtration |
| Catalin Corp. | Riverdale, Ill. | Plastics | C-7 | 1.50 | 1,800 | None |
| Acme Steel Corp. | " | Iron & Steel | C-8 | 48. | 1,500(5) | Settling, Oil Separation |

TABLE 10c

INDUSTRIAL WASTE INVENTORY
ILLINOIS RIVER SYSTEM

| Industry | Location | Classification | Map Location Code | Effluent MGD | P.E.(1) (5-day B.O.D.) | Treatment |
|---|---|---|---|---|---|---|
| | Bloom Township, Ill. | (Food, Wood Products, (Chemical, Metal (Fabricating & Finishing, (Machinery Mfg. | Twenty Plants C-9 | 8. | 4,700(3) | Unknown |
| Clark Oil & Refining Co | Blue Island, Ill. | Refinery | C-10 | 27.60 | 21,000 | Oil Separation |
| | | (Iron, Steel, Coke, (Metal Finishing, (Chemical | Seven Other Plants | 94.08 | 900 | Unknown |
| SUBTOTAL | | | | 316.08 | 92,000 | |
| | | DES PLAINES RIVER | | | | |
| | | (Machinery Mfg, Metal (Fabricating & Finishing, (Food, Transportation, (& Rubber Products | Fourteen Plants | 1.15 | 4,000(5) | Unknown |
| SUBTOTAL | | | | 1.15 | 4,000 | |
| | | DU PAGE RIVER | | | | |
| | | (Metal Fabrication, (& Finishing, Food, (Chemical & Equipment (Mfg. | Twelve Plants | 1.12 | 2,000(5) | Unknown |
| SUBTOTAL | | | | 1.12 | 2,000 | |

TABLE 10d

INDUSTRIAL WASTE INVENTORY
ILLINOIS RIVER SYSTEM

| Industry | Location | Classification | Map Location Code | Effluent MGD | P.E.(1) (5-day B.O.D. | Treatment |
|---|---|---|---|---|---|---|
| | | | FOX RIVER | | | |
| Hebron Packing Co. | Hebron, Ill. | Food | F-1 | 0.10 | 1,300(5) | Unknown |
| National Yeast Corp. | Crystal Lake | Food | F-2 | 0.70 | 4,000(5) | " |
| Kerber Packing Co. | Elgin, Ill. | Food | F-3 | 0.12 | 1,900 | " |
| Hawley Products Co. | St. Charles, Ill. | Equipment Mfg. | F-4 | 0.58 | 1,100 | " |
| Elburn Packing Co. | Elburn, Ill. | Food | F-5 | 0.23 | 1,400 | " |
| | | (Food, Chemical & (Furniture Mfg. | Three Other Plants | 0.10 | 1,500(5) | Unknown |
| SUBTOTAL | | | | 1.83 | 11,200 | |

TABLE 11 a

INDUSTRIAL WASTE INVENTORY
CALUMET AREA IN NORTHWEST INDIANA TRIBUTARY TO LAKE MICHIGAN

| Industry | Location | Classification | Map Location Code | Effluent M.G.D. | P.E.(1) (5-Day B.O.D.) | Treatment |
|---|---|---|---|---|---|---|
| | | CALUMET RIVER | | | | |
| U.S. Steel Corp. (South Works) | Chicago, Ill. | Iron & Steel | M-10 | 498. | 20,000(5) | Settling & Oil Separation |
| SUBTOTAL | | | | 498. | 20,000 | |
| | | INDIANA HARBOR - GRAND CALUMET RIVER | | | | |
| American Maize Products Co. | Hammond, Ind. | Food | M-1 | 11. | 44,000 | Lagooning, Filtration |
| U.S. Gypsum Co. | E.Chicago, Ind. | Paper | M-2 | 1. | 5,000(5) | Unknown |
| Stiener Co. Inc. | Gary, Ind. | Paper | M-3 | 1. | 5,000 | Save-All |
| Union Carbide Chemicals Co. | Whiting, Ind. | Chemical | M-4 | 58. | 21,000(5) | Oil Separation |
| E.I. DuPont de Nemours & Co. | E.Chicago, Ind. | Chemical | M-5 | 9. | 14,000(5) | Settling & Chemical Treatment |
| American Oil Co. | Whiting, Ind. | Refinery | M-6 | 149. | 145,000 | Secondary Treatment & Oil Separation |
| Sinclair Refining Co. | E.Chicago, Ind. | Refinery | M-7 | 9. | 47,000(5) | Oil Separation |
| Mobil Oil Co. | E.Chicago, Ind. | Refinery | M-8 | 5. | 24,000(5) | Oil Separation & Filtration |
| Cities Service Oil Co. | E.Chicago, Ind. | Refinery | M-9 | 89. | 50,000(5) | Oil Separation |
| Youngstown Sheet & Tube Co. | E.Chicago, Ind. | Steel Products | M-11 | 300. | 110,000(5) | Settling & Oil Separation |
| Inland Steel Corp. | E.Chicago, Ind. | Steel | M-12 | 700. | 241,000 | Oil Separation & Settling |
| U.S.Steel Corp. (Gary Works) | Gary, Ind. | Iron & Steel | M-13 | 637. | 75,000(5) | Chemical Treatment, Oil Separation & Settling |
| Midwest Steel Division | Portage, Ind. | Steel | M-14 | 18. | 10,000 | Chemical Treatment & Oil Separation |
| SUBTOTAL | | | | 1987. | 791,000 | |

TABLE 11 b
INDUSTRIAL WASTE INVENTORY
CALUMET AREA IN NORTHWEST INDIANA TRIBUTARY TO LAKE MICHIGAN

| Industry | Location | Classification | Map Location Code | Effluent M.G.D. | P.E. (5-Day B.O.D.)(1) | Treatment |
|---|---|---|---|---|---|---|
| | BURNS DITCH - LITTLE CALUMET RIVER | | | | | |
| | | Food. | Two Plants | .53 | 1,000(5) | Unknown |
| SUBTOTAL | | | | .53 | 1,000 | |
| TOTAL | | | | 2485.53 | 812,000 | |

TABLE 12

LAKE MICHIGAN FROM THE ILLINOIS-WISCONSIN LINE SOUTHEAST TO BURNS DITCH IN NORTHWEST INDIANA

| Industry | Location | Classification | Map Location Code | Effluent M.G.D. | P.E.(1) (5-day BOD) | Treatment |
|---|---|---|---|---|---|---|
| | | WAUKEGAN-HIGHLAND PARK AREA | | | | |
| Abbott Laboratories | North Chicago, Ill. | Pharmaceutical and Chemical | M-15 | 0.30 | 8,200 | Secondary |
| | | Steel Products, Specialty Metals | Two Other Plants | 7.30 | 600(5) | Settling, Oil Separation |
| SUBTOTAL | | | | 7.60 | 8,800 | |
| | | CALUMET AREA IN NORTHWEST INDIANA TRIBUTARY TO LAKE MICHIGAN | | | | |
| SUBTOTAL FROM TABLE 11 | | | | 2485.53 | 812,000 | |
| TOTAL (LAKE MICHIGAN) | | | | 2493.13 | 820,800 | |

FOOTNOTES TO TABLES 10, 11, AND 12

(1) As discharged
(2) 24-hour PE value estimated from eight hour observations
(3) Total PE value of industries in Bloom Township drained by the State Street Ditch.
(4) Total PE value of industries drained by the Summit-Lyons Conduit.
(5) Estimated

TABLE 13

SOURCES OF VESSEL POLLUTION - CHICAGO AND ENVIRONS

| Average Port-Stay Days | VESSEL TRIPS (Self Propelled Craft) | | | | | | Cargo Tonnage | Season Days | Shuttle & Sightseeing Passengers | Waste Discharged PE | Harbor |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dry Cargo | Tug or Tow | Tanker | Fishing | Other | Total | | | | | |
| 1.0 | 767 | | 35 | | | 802 | 9,289,215 | 230 | | 70 | GARY |
| 1.0 | 370 | | | | | 370 | 1,753,357 | 230 | | 30 | BUFFINGTON |
| 1.75 | 772 | 271 | 1590 | | | 2633 | 20,013,116 | 230 | | 400 | INDIANA |
| 2.75 | 281 | 3 | 119 | 1000 | 3527 | 4930 | 575,229 | 230 | 239,177 | 350 | CHICAGO |
| 2.0 | 1401 | 1742 | 137 | | 100 | 3380 | 19,423,135 | 230 | | 600 | CALUMET & RIVER |
| 4.3 | 304 | 5 | 47 | | | 356 | 702,145 | 230 | | 140 | LAKE CALUMET |
| 1.0 | 130 | 1390 | 7 | | 461 | 1988 | 4,280,894 | 230 | | 90 | CHGO. R. Main, N&S Branches |
| 1.0 | | 1421 | | | 1046 | 2467 | 12,476,480 | 230 | | 50 | CHGO. SANITARY & SHIP CANAL |
| 1.0 | | 224 | | | | 224 | 846,977 | 230 | | 10 | CAL-SAG CHANNEL |
| TOTALS | 4025 | 5056 | 1935 | 1000 | 5134 | 17,150 | 69,360,548 | | 239,177 | 1740 | |

TABLE 14 a
FEDERAL INSTALLATIONS

ILLINOIS

| Installation | Discharge | Surface Water Body |
|---|---|---|
| **Lake Co.** | | |
| 1. Naval Training Center-East (Great Lakes) | 3,000,000 GPD Sewage Secondary w/chlorination | Lake Michigan |
| 2. Naval Training Center-West (Great Lakes) | 750,000 GPD Sewage Secondary | Skokie Creek |
| 3. Nike Site (Half Day) | 4,000 GPD Sewage Secondary | Indian Creek |
| 4. Fort Sheridan | 500,000 GPD Sewage 18,700 GPD Indus. Secondary w/chlorination | Lake Michigan |
| 5. Nike Site (Near Palatine) | 3,600 ~~300,000~~ GPD Sewage Secondary | Buffalo Creek |
| **Cook Co.** | | |
| 6. Nike Qtrs. (Worth) | 3,600 GPD Sewage Secondary | Cal Sag Channel |
| 7. Nike Qtrs. (Worth) | 2,000 GPD Sewage Secondary | Cal Sag Channel |
| 8. Nike MNT Shop (Orland Park) | 3,000 GPD Sewage 800 GPD Indus. Secondary | Marley Creek |
| 9. Nike Qtrs. (Orland Park) | 10,000 GPD Sewage Secondary | Marley Creek |
| 10. Nike Site (Orland Park) | 4,000 GPD Sewage Secondary | Marley Creek |
| 11. DA Housing (LeMont) | 200 GPD Sewage No Treatment | Chicago San. & Ship Canal |

TABLE 14 b

| Installation | Discharge | Surface Water Body |
|---|---|---|
| DuPage Co. | | |
| 12. Argonne National Lab. | 600,000 GPD<br>1,130 GPD Indus.<br>Secondary Plants | Des Plaines River |
| 13. Nike Site (Addison) | 10,000 GPD Sewage<br>Secondary | UNNamed Swamp Trib.<br>To Salt Creek |
| Will Co. | | |
| 14. Joliet Arsenal - Elwood Unit | 462,000 GPD Sewage<br>Secondary<br>Indus. Floor Washings<br>(No Est.) | Prairie Creek<br>25 Acre Pond |
| 15. Joliet Arsenal-Kankakee Unit | 6,000 GPD Sewage<br>Secondary<br>185,500 GPD Sewage<br>Primary<br>Indus. (Inactive) | Jackson Creek<br>Grant Creek |
| 16. Lockport Lock & Dam (Lockport) | 450 GPD Sewage<br>NO Treatment | Des Plaines River |
| 17. Brandon Road I&D (Joliet) | 450 GPD Sewage<br>NO Treatment | Des Plaines River |

TABLE 14 c

INDIANA

| Installation | Discharge | Surface Water Body |
|---|---|---|
| Lake Co. | | |
| 18. DA Housing (Highland) | 1,400 GPD Sewage NO Treatment | Little Calumet River |
| 19. Indiana Hbr. E. Bkw. Lt. (Near East Chicago) | 280 GPD Sewage NO Treatment | Lake Michigan |
| 20. DA Housing (Schererville) | 200 GPD Sewage NO Treatment | Cady Marsh-Hart Ditch Trib. to Little Calumet River |
| 21. Nike Site (Munster) | 10,000 GPD Sewage Secondary | Hart Ditch Trib. to Little Calumet River |
| Porter Co. | | |
| 22. Nike (Wheeler) | 10,000 GPD Sewage Primary | Unnamed Ditch |
| 23. Nike Site Launching (Chesterton) | 1,000 GPD Sewage Secondary | Dunes Creek to Little Calumet River |
| 24. Nike Site Housing | 9,000 GPD Sewage Secondary | Dunes Creek to Little Calumet River |

TABLE 15a

FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS
IN CHICAGO AND ENVIRONS

| Municipalities | Type of Treatment | Facility 1/ | Cost | Federal Grant | Status | Present Pop. Served |
|---|---|---|---|---|---|---|
| STATE OF ILLINOIS | | | | | | |
| 1. Village of Algonquin | Secondary | STP | $226,558 | $67,976 | Complete | 1,223 |
| 2. City of Crystal Lake | Secondary | STP | 204,664 | 61,399 | Under Construction | 8,314 |
| 3. City of Harvard | Secondary | STP | 162,440 | 48,732 | Complete | 3,905 |
| 4. Village of Huntley | Secondary | STP | 61,146 | 18,343 | Complete | 830 |
| 5. Village of Richmond | Secondary | STP | 51,997 | 15,599 | Complete | 623 |
| 6. City of Woodstock | Secondary | STP, Int. | 365,000 | 109,500 | Under Construction | 8,859 |
| 7. City of Wauconda | Secondary | STP | 238,542 | 71,562 | Complete | 1,173 |
| 8. Village of Deerfield | Secondary | STP | 293,608 | 88,082 | Complete | 11,711 |
| 9. Gages Lake San. Dist. | Secondary | STP | 279,488 | 83,846 | Under Construction | 4,076 |
| 10. Village of Lake Villa | Secondary | STP P/S, F/M | 145,921 | 43,776 | Complete | 824 |
| 11. Round Lake San. Dist | Secondary | STP | 547,947 | 160,685 | Complete | 11,270 |
| 12. North Shore San. Dist. | Secondary | STP | 668,384 | 200,515 | Complete | 38,940 |
| 13. Village of Antioch | Secondary | STP | 220,976 | 65,016 | Complete | 2,268 |
| 14. Village of Fox Lake | Secondary | STP Int. | 718,390 | 215,517 | Complete | 2,238 |

TABLE 15b

FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS
IN CHICAGO AND ENVIRONS

| | Municipalities | Type of Treatment | Facility 1/ | Cost | Federal Grant | Status | Present Pop. Served |
|---|---|---|---|---|---|---|---|
| STATE OF ILLINOIS | | | | | | | |
| 15. | City of Batavia | Secondary | STP, Int. | $548,414 | $164,524 | Complete | 5,838 |
| 16. | San. Dist. of Elgin | Secondary | STP | $1,008,625 | $250,000 | Under Construction | 43,500 |
| 17. | City of St. Charles | Secondary | STP | $194,990 | $58,497 | Complete | 9,207 |
| 18. | Village of Lansing | Secondary | STP | $682,759 | $204,827 | Complete | 15,675 |
| 19. | Village of Thornton | Secondary | STP | $109,602 | $32,880 | Complete | 1,217 |
| 20. | Downers Grove San. Dist. | Secondary | STP | $551,400 | $160,420 | Under Construction | 27,000 |
| 21. | Village of Roselle | Secondary | STP | $230,607 | $69,182 | Under Construction | 3,581 |
| 22. | Salt Creek San. Dist. | Secondary | STP | $203,776 | $45,600 | Complete | 12,100 |
| 23. | City of West Chicago | Secondary | STP | $614,000 | $172,507 | Complete | 5,316 |
| 24. | Wheaton San. Dist. | Secondary | STP Int. | $1,545,500 | $463,650 | Under Construction | 27,000 |
| 25. | Village of Winfield | Secondary | STP, Int. | $369,090 | $82,500 | Under Construction | 1,189 |
| 26. | Village of Wood Dale | Secondary | STP, P/S, Int. | $304,711 | $91,012 | Complete | 1,857 |
| 27. | Village of Beecher | Secondary | STP | $165,220 | $49,566 | Under Construction | 1,367 |

TABLE 15c

FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS
IN CHICAGO AND ENVIRONS

| Municipalities | Type of Treatment | 1/ Facility | Cost | Federal Grant | Status | Present Pop. Served |
|---|---|---|---|---|---|---|
| STATE OF ILLINOIS | | | | | | |
| 28. Village of Frankfort | Secondary | STP | 186,057 | 55,817 | Complete | 685 |
| 29. City of Lockport | Primary | STP, P/S Int. | 426,064 | 126,019 | Complete | 4,954 |
| 30. Village of Mokena | Secondary | STP, Out. P/S | 215,348 | 64,604 | Complete | 903 |
| 31. Village of New Lenox | Secondary | STP, Int. | 225,936 | 67,780 | Complete | 1,235 |
| 32. Village of Peotone | Secondary | STP | 147,659 | 40,000 | Complete | 1,146 |
| 33. Village of Plainfield | Secondary | STP | 70,000 | 21,000 | Under Construc-tion | 2,200 |
| 34. City of Wilmington | Secondary | STP, P/S F/M | 282,676 | 84,802 | Complete | 3,354 |
| 35. Village of Bourbannais | Secondary | STP, Int. | 218,843 | 65,653 | Complete | 1,598 |
| 36. City of Kankakee | Secondary | STP | 881,003 | 250,000 | Complete | 33,000 |
| 37. Village of Manteno | Secondary | STP, Out P/S, Int. | 235,979 | 70,793 ~~70,000~~ | Complete | 1,789 |
| 38. City of Momence | Secondary | STP | 209,898 | 70,260 | Under Construc-tion | 2,747 |
| ILLINOIS SUB-TOTALS | 38 projects | | $13,813,248 | $4,012,431 | | 304,712 |

TABLE 15d

FEDERALLY AIDED SEWAGE TREATMENT WORKS PROJECTS
IN CHICAGO AND ENVIRONS

| Municipalities | Type of Treatment | 1/ Facility | Cost | Federal Grant | Status | Present Pop. Served |
|---|---|---|---|---|---|---|
| STATE OF INDIANA | | | | | | |
| 39. Town of Griffith | Secondary | Int.P/S, F/M,Out. | $1,519,000 | 250,000 | Under Construc-tion | 9,445 |
| 40. San. Dist. of Hammond | Secondary | STP, P/S | 2,452,006 | 250,000 | Under Construc-tion | 154,915 |
| 41. San. Dist. of Hammond | Secondary | Int. | 810,000 | 243,000 | Under Construc-tion | 12,000 |
| 42. City of Hobart | Secondary | STP, Int. | 1,043,239 | 250,000 | Under con-struction | 10,244 |
| INDIANA SUB-TOTALS | 4 projects | | $5,824,245 | $993,000 | | 186,004 |
| GRAND TOTALS | 42 projects | | $19,637,493 | $5,005,431 | | 490,716 |

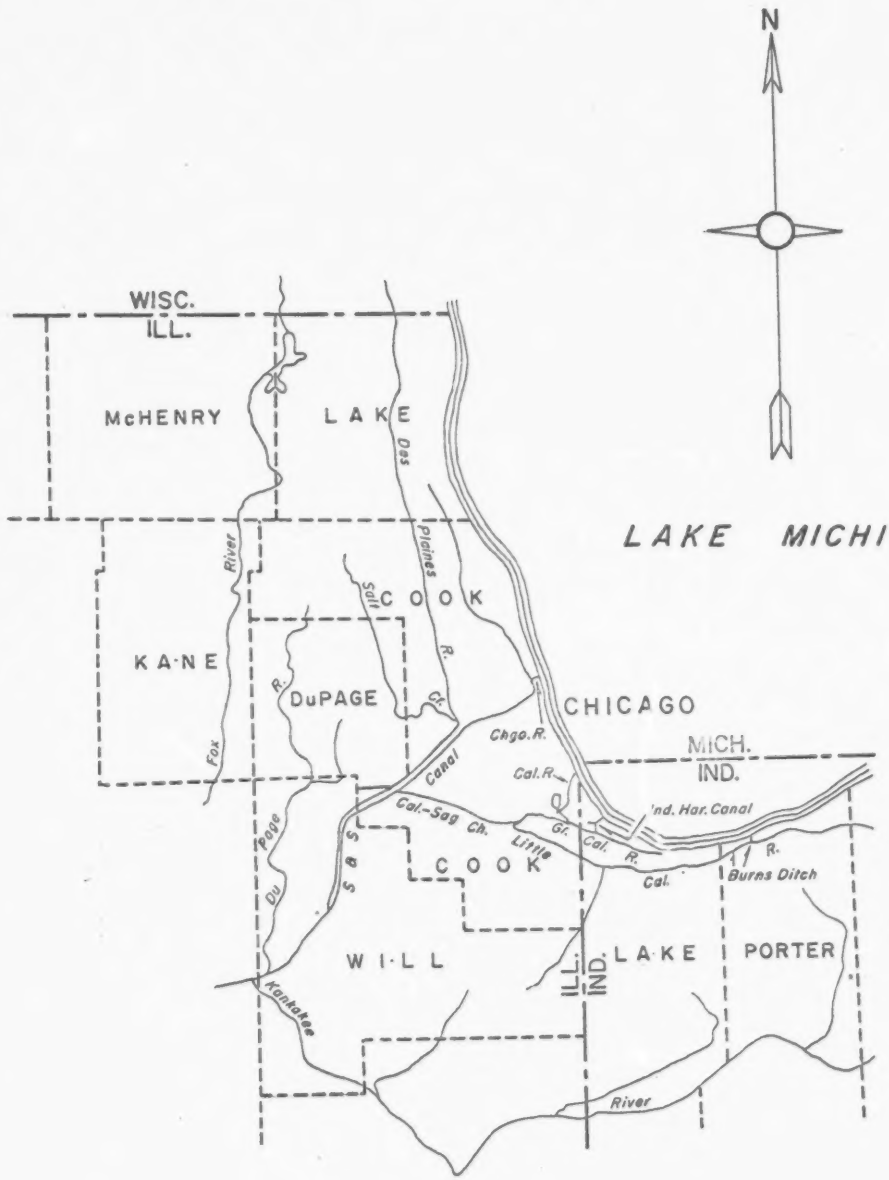
1/ STP -- Sewage Treatment Plant
Int.-- Interceptor Sewer
Out.-- Outfall
P/S -- Pumping Station
F/M -- Force Main

GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

# GREAT LAKES AND ILLINOIS RIVER BASINS

U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE I



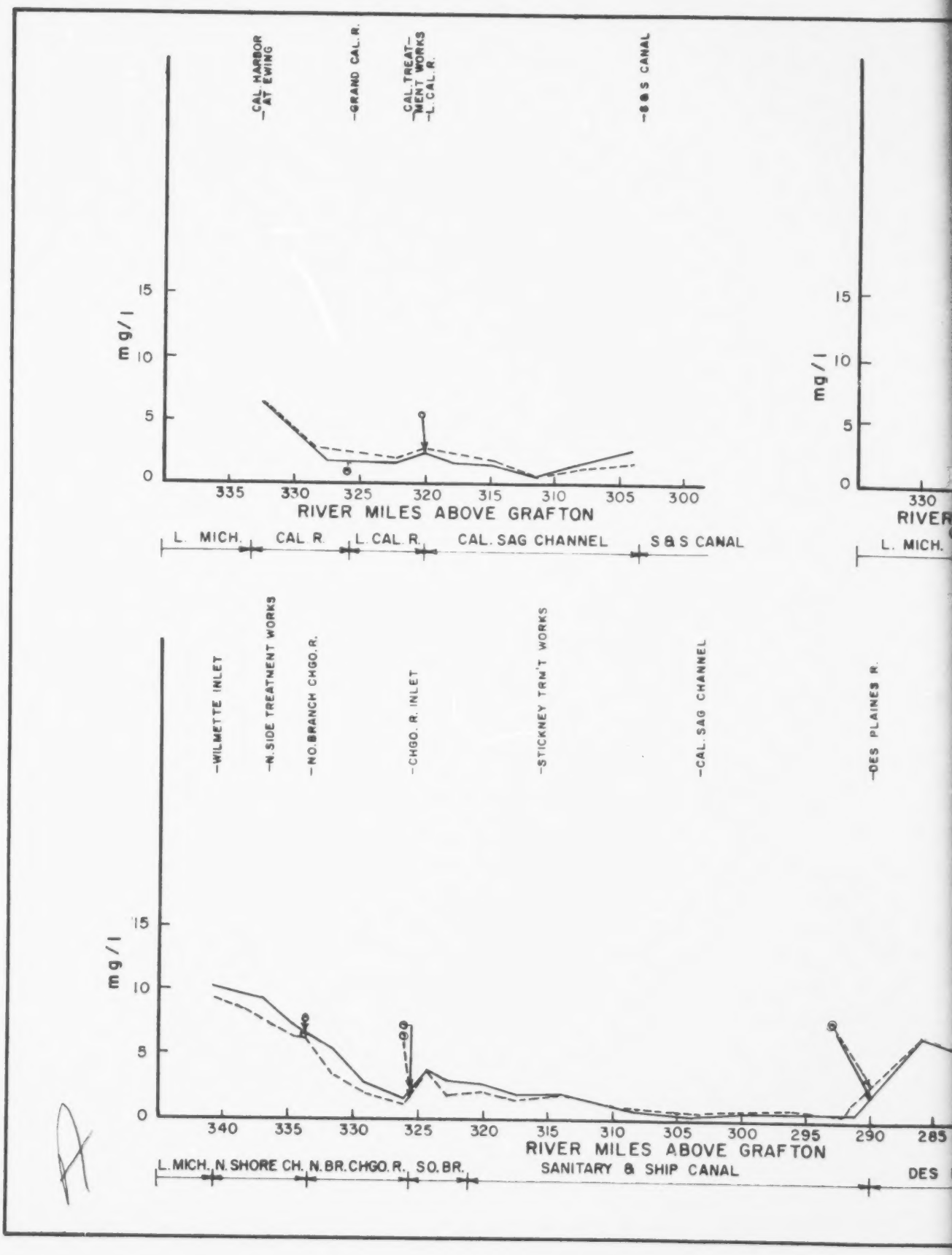

Scale
0 10 20 30 Miles

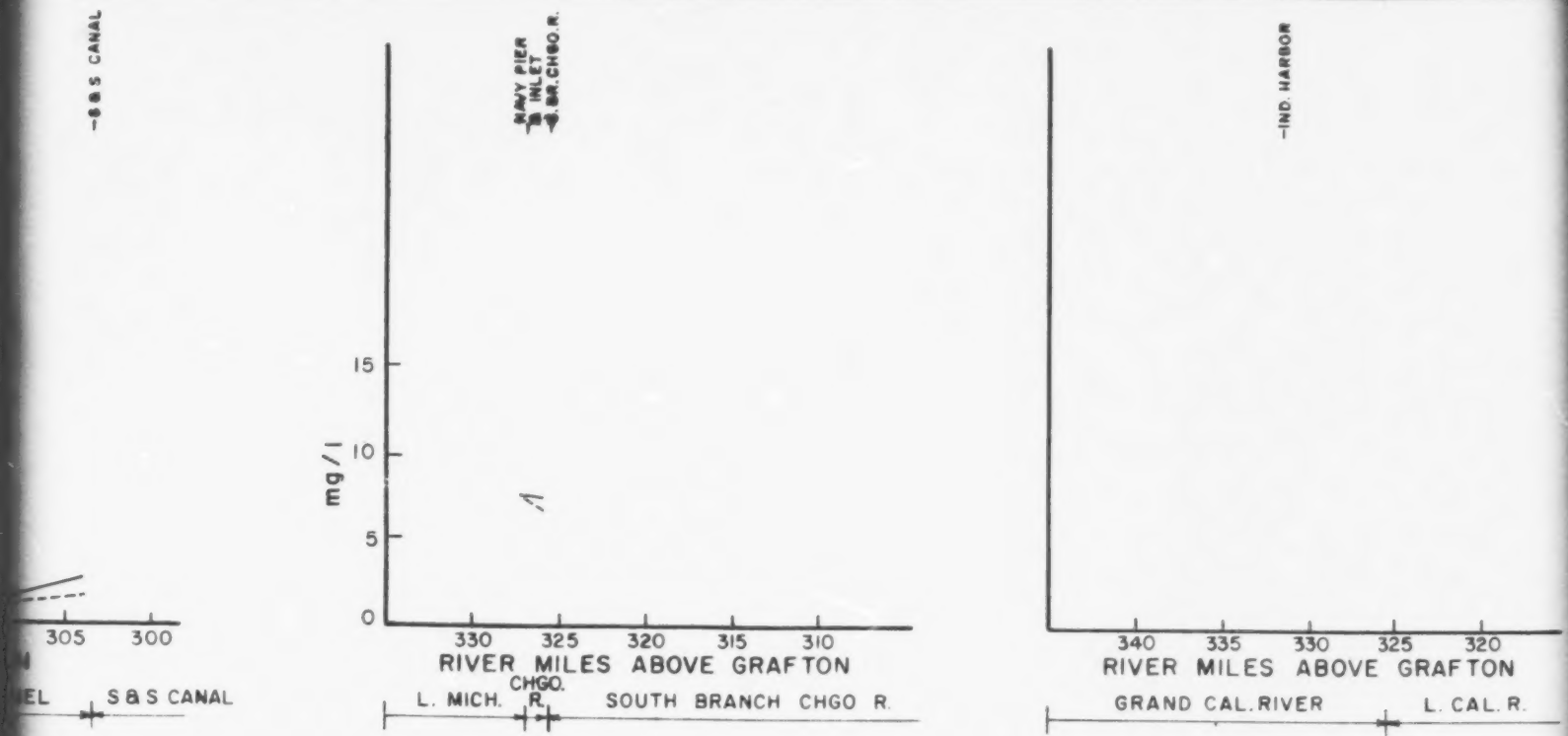
GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

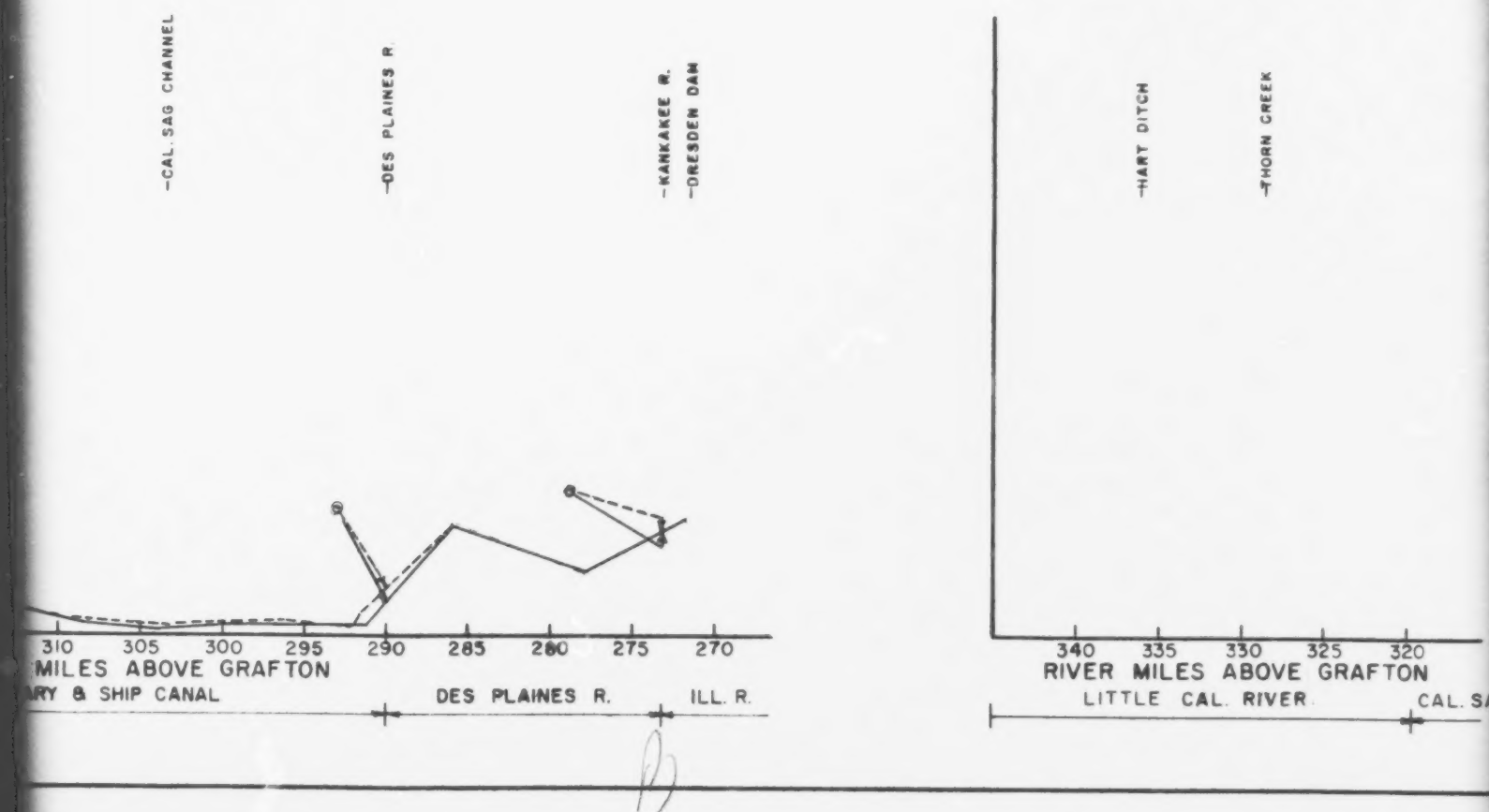
CHICAGO AREA & ENVIRONS

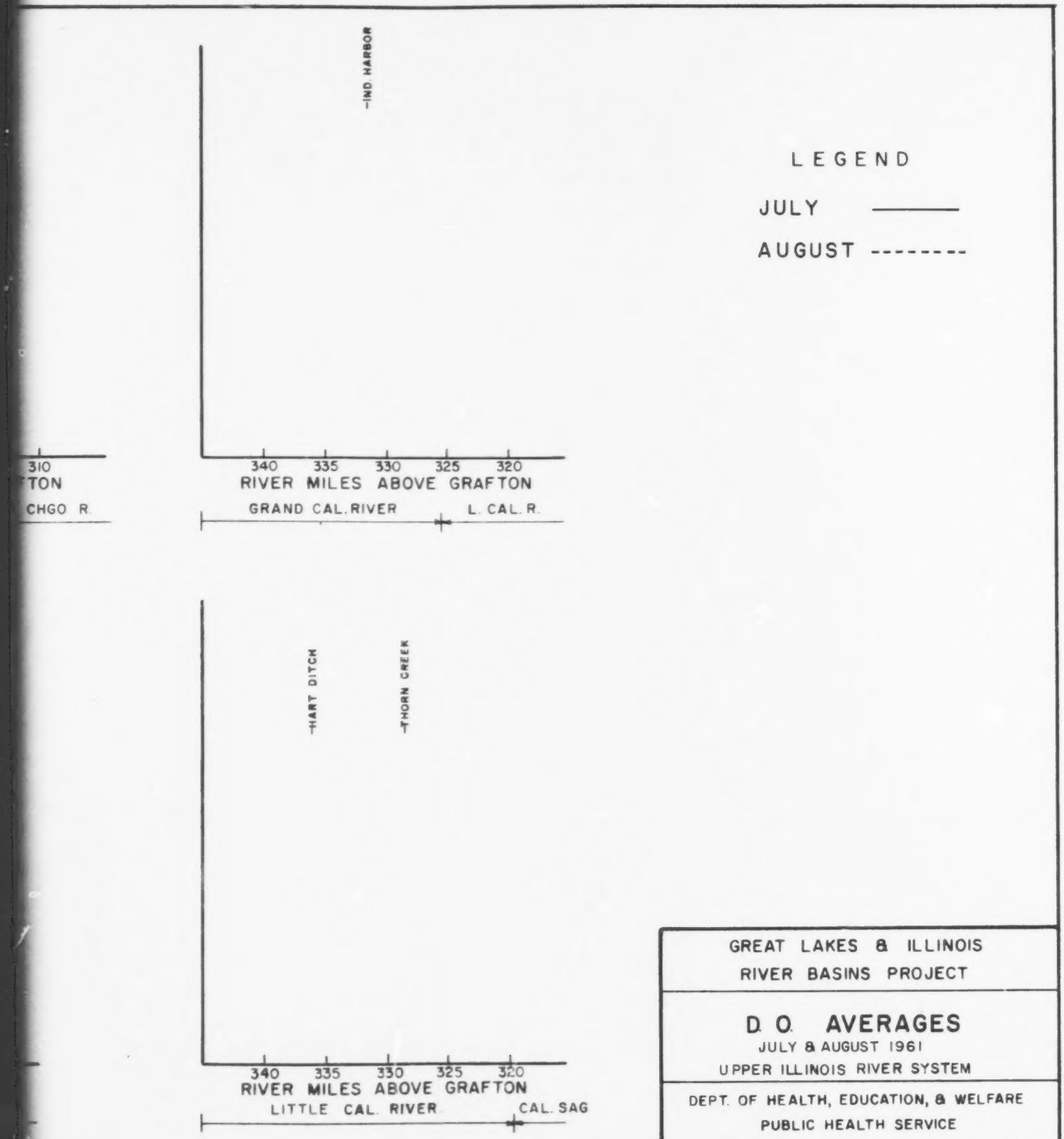
U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 2


CAL. HARBOR AT EWING
GRAND CAL. R.
CAL. TREAT-MENT WORKS L. CAL R.
S & S CANAL
mg/l
15
10
5
0
335
330
325
320
315
310
305
300
RIVER MILES ABOVE GRAFTON
L. MICH.
CAL R.
L. CAL R.
CAL. SAG CHANNEL
S & S CANAL
330
RIVER
L. MICH.
WILMETTE INLET
N. SIDE TREATMENT WORKS
NO. BRANCH CHGO. R.
CHGO. R. INLET
STICKNEY TRM'T WORKS
CAL. SAG CHANNEL
DES PLAINES R.
mg/l
15
10
5
0
340
335
330
325
320
315
310
305
300
295
290
285
RIVER MILES ABOVE GRAFTON
L. MICH.
N. SHORE CH.
N. BR. CHGO. R.
SO. BR.
SANITARY & SHIP CANAL
DES


S & S CANAL
NAVY PIER
N. INLET
N. BR. CHGO. R.
IND. HARBOR
mg/l
15
10
5
0
330 325 320 315 310
RIVER MILES ABOVE GRAFTON
305 300
EL
S & S CANAL
L. MICH.
CHGO. R.
SOUTH BRANCH CHGO R.
340 335 330 325 320
RIVER MILES ABOVE GRAFTON
GRAND CAL. RIVER
L. CAL. R.


CAL. SAG CHANNEL
DES PLAINES R.
KANKAKEE R.
DRESDEN DAN
HART DITCH
THORN CREEK
310 305 300 295 290 285 280 275 270
MILES ABOVE GRAFTON
RY & SHIP CANAL
DES PLAINES R.
ILL. R.
340 335 330 325 320
RIVER MILES ABOVE GRAFTON
LITTLE CAL. RIVER
CAL. SA




GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

# D. O. AVERAGES

JULY & AUGUST 1961
UPPER ILLINOIS RIVER SYSTEM

DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 3

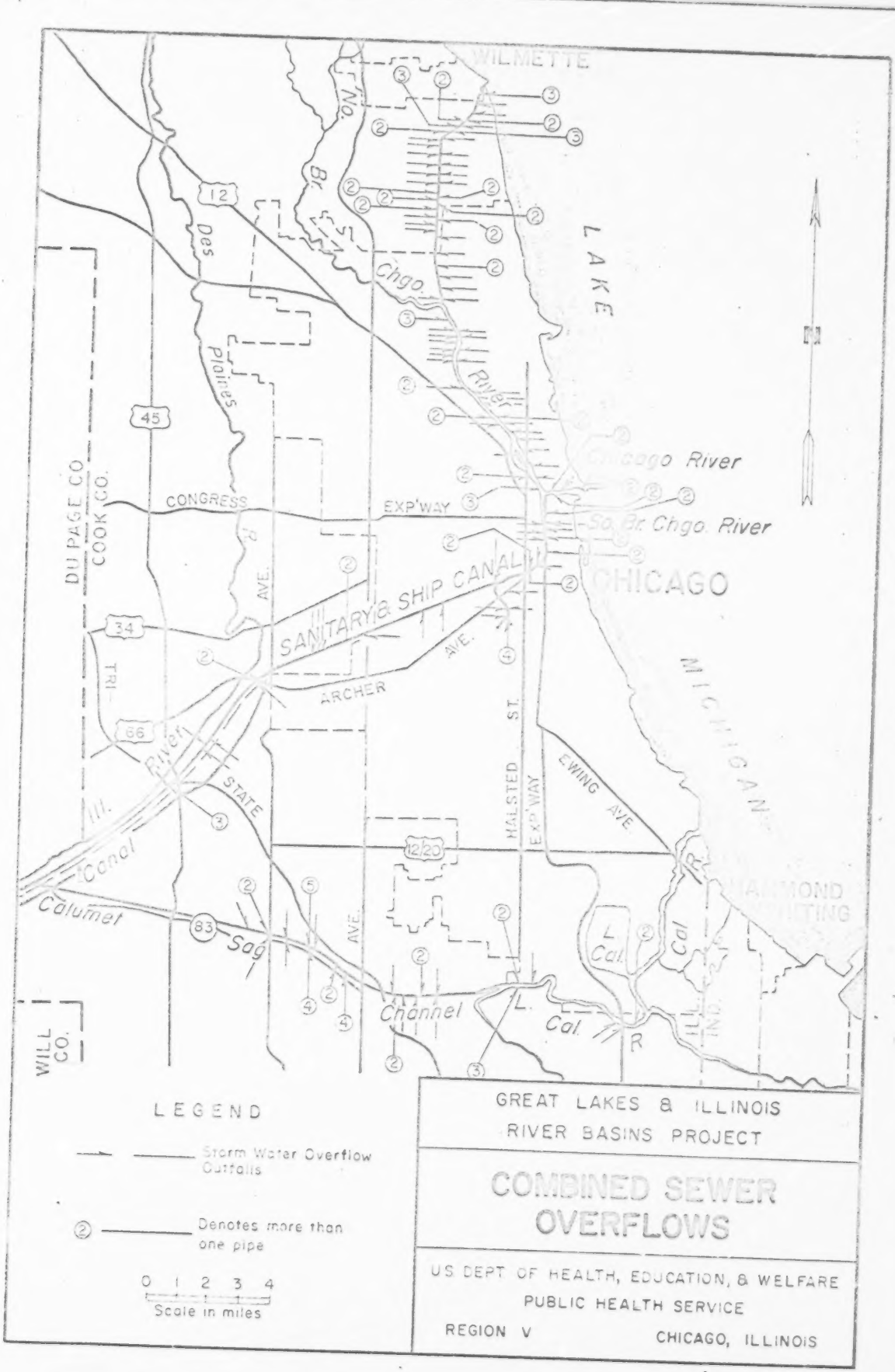
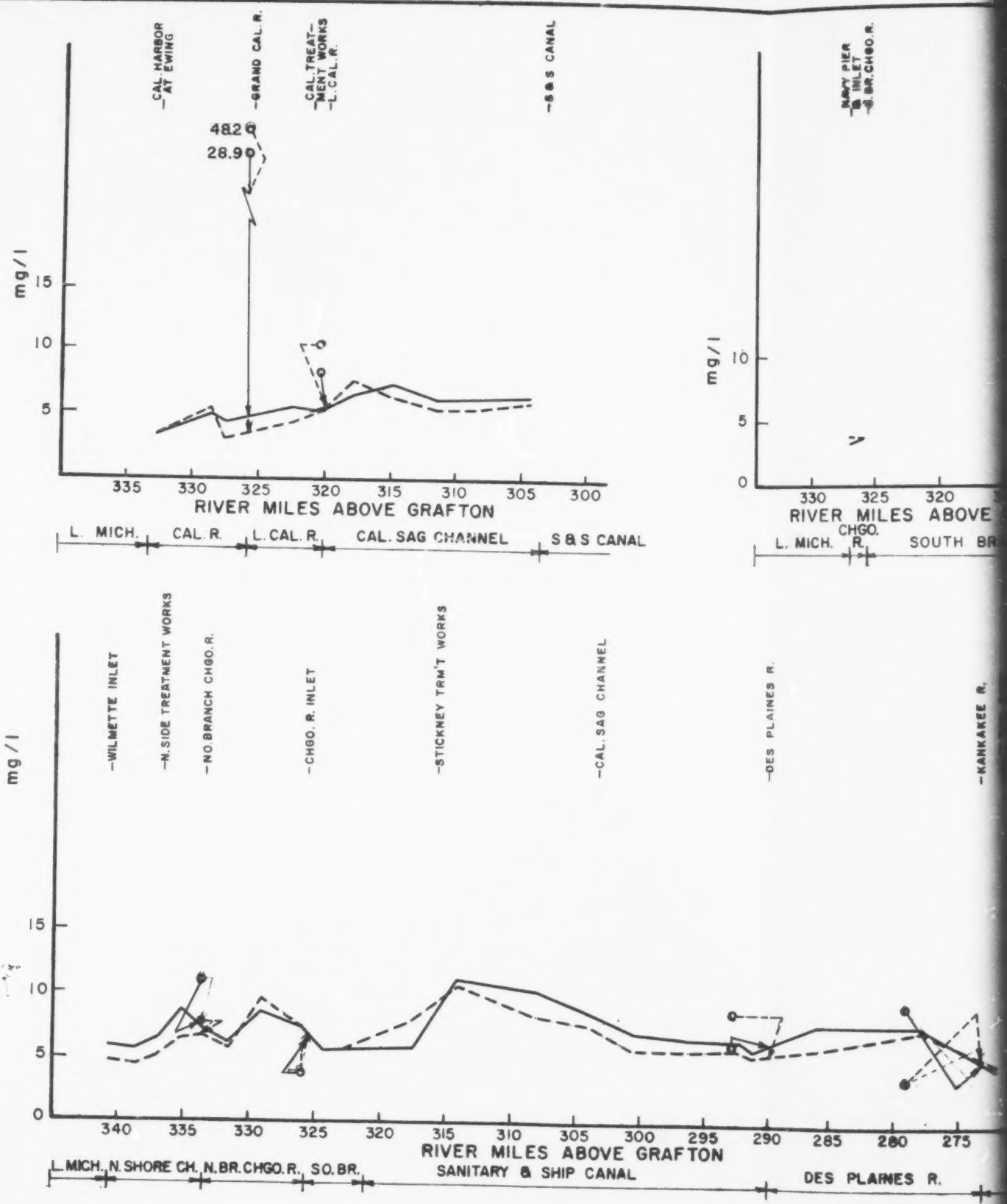
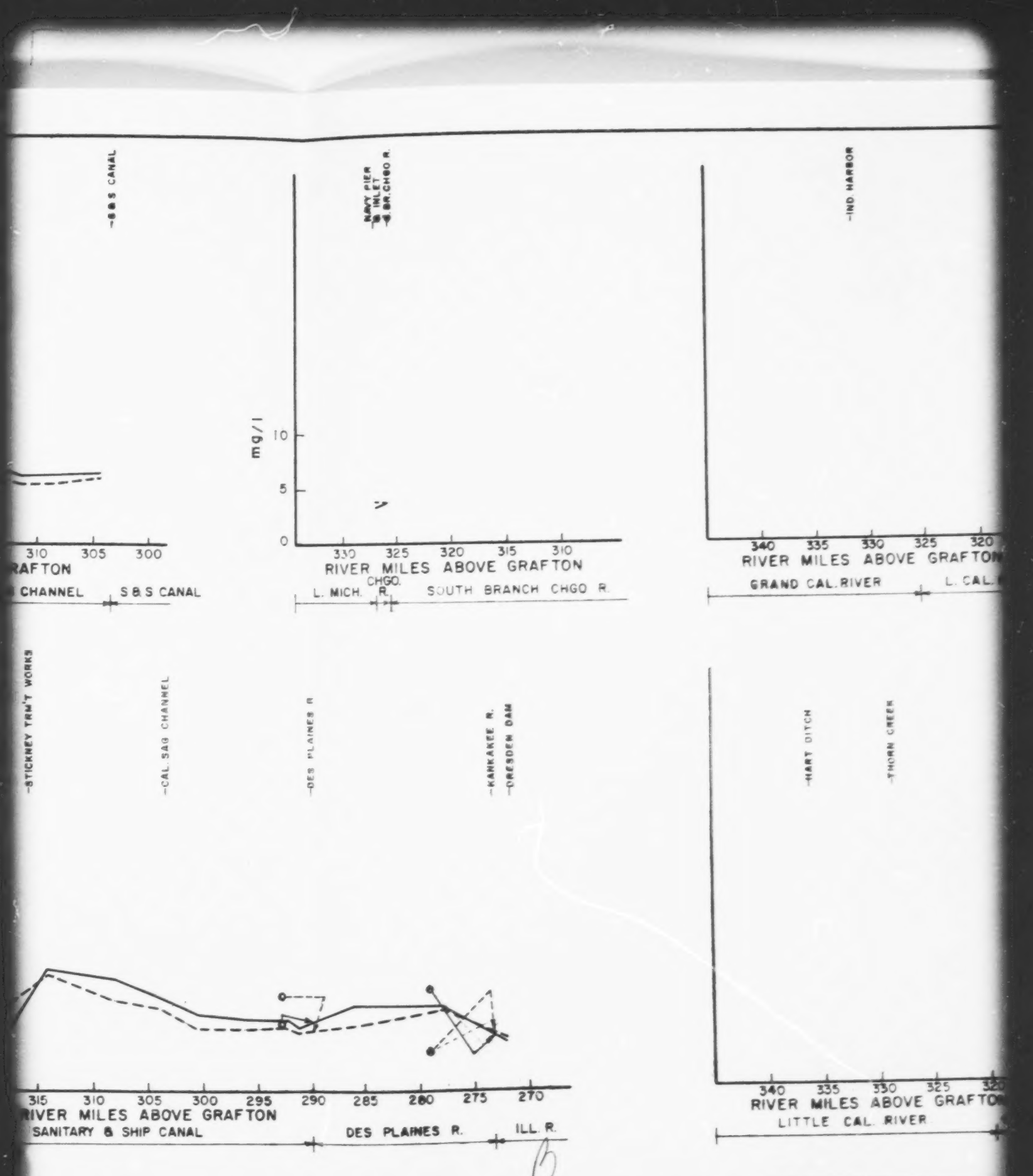
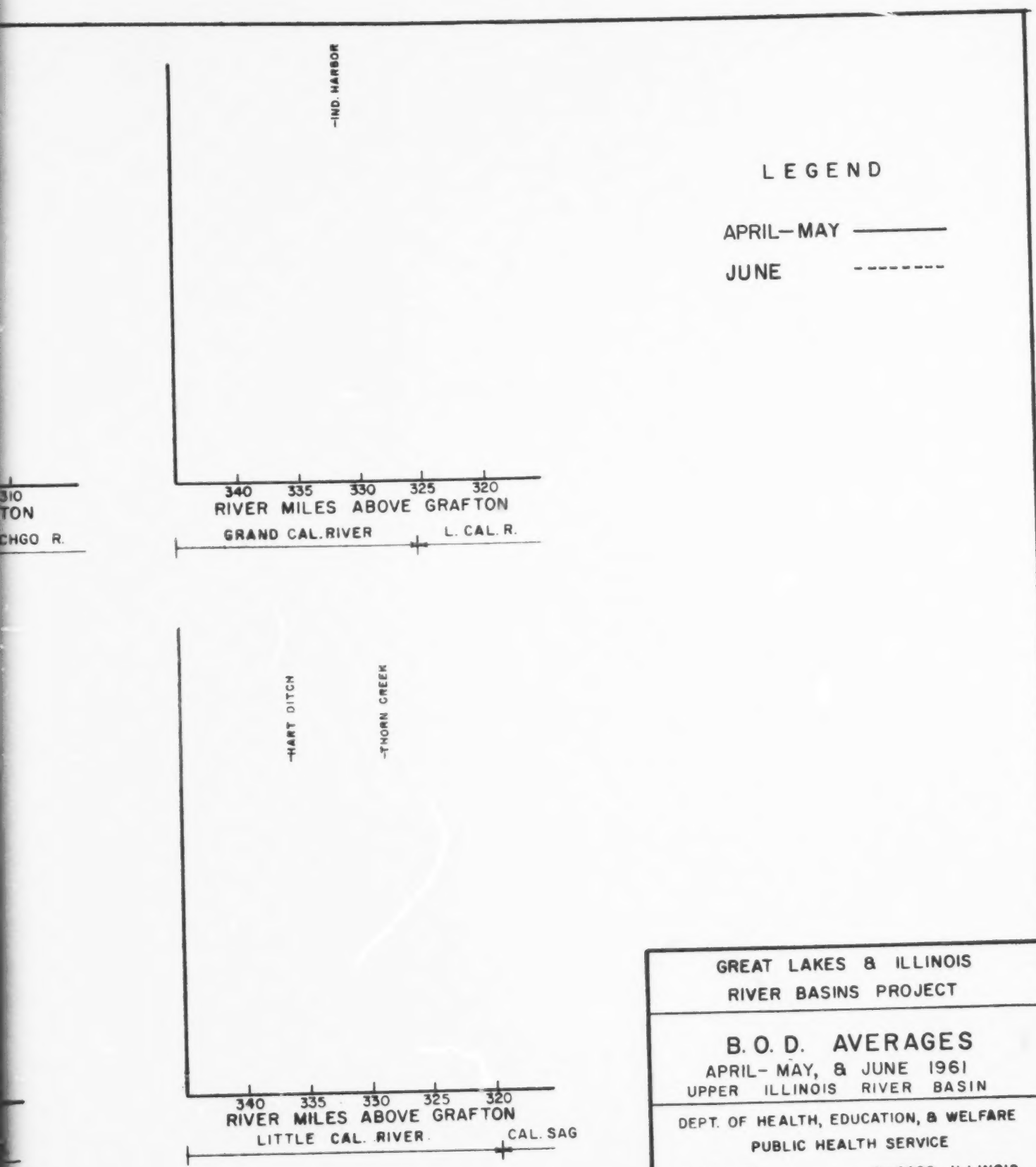

WILMETTE
LAKE
MICHIGAN
CHICAGO
Chicago River
So. Br. Chgo. River
Chgo. River
N. Br.
Des Plaines River
SANITARY & SHIP CANAL
CONGRESS EXP'WAY
ARCHER AVE.
HALSTED ST.
EXP'WAY
EWING AVE
STATE
Ill. & Mich. Canal
Calumet Sag Channel
L. Cal R
DU PAGE CO.
COOK CO.
WILL CO.
12
45
34
66
83
12/20
LEGEND
Storm Water Overflow Outfalls
Denotes more than one pipe
0 1 2 3 4
Scale in miles
GREAT LAKES & ILLINOIS RIVER BASINS PROJECT
COMBINED SEWER OVERFLOWS
US DEPT OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 4


CAL. HARBOR AT EWING
GRAND CAL. R.
CAL. TREATMENT WORKS L. CAL. R.
S & S CANAL
4820
28.90
mg/l
15
10
5
335 330 325 320 315 310 305 300
RIVER MILES ABOVE GRAFTON
L. MICH.
CAL. R.
L. CAL. R.
CAL. SAG CHANNEL
S & S CANAL
NAVY PIER
INLET
S. BR. CHGO. R.
mg/l
10
5
0
330 325 320
RIVER MILES ABOVE
CHGO. R.
L. MICH.
SOUTH BR
WILMETTE INLET
N. SIDE TREATMENT WORKS
NO. BRANCH CHGO. R.
CHGO. R. INLET
STICKNEY TRM'T WORKS
CAL. SAG CHANNEL
DES PLAINES R.
KANKAKEE R.
mg/l
15
10
5
0
340 335 330 325 320 315 310 305 300 295 290 285 280 275
RIVER MILES ABOVE GRAFTON
L. MICH.
N. SHORE CH.
N. BR. CHGO. R.
SO. BR.
SANITARY & SHIP CANAL
DES PLAINES R.


-S & S CANAL
NAVY PIER
INLET
-SR. CHGO R.
-IND HARBOR
mg/l
10
5
0
310 305 300
RAFTON
CHANNEL
S & S CANAL
330 325 320 315 310
RIVER MILES ABOVE GRAFTON
L. MICH.
CHGO.
R.
SOUTH BRANCH CHGO R.
340 335 330 325 320
RIVER MILES ABOVE GRAFTON
GRAND CAL. RIVER
L. CAL.
-STICKNEY TRM'T WORKS
-CAL. SAG CHANNEL
-DES PLAINES R
-KANKAKEE R.
-DRESDEN DAM
-HART DITCH
-THORN CREEK
315 310 305 300 295 290 285 280 275 270
RIVER MILES ABOVE GRAFTON
SANITARY & SHIP CANAL
DES PLAINES R.
ILL. R.
340 335 330 325 320
RIVER MILES ABOVE GRAFTON
LITTLE CAL. RIVER




GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

# B. O. D. AVERAGES

APRIL– MAY, & JUNE 1961

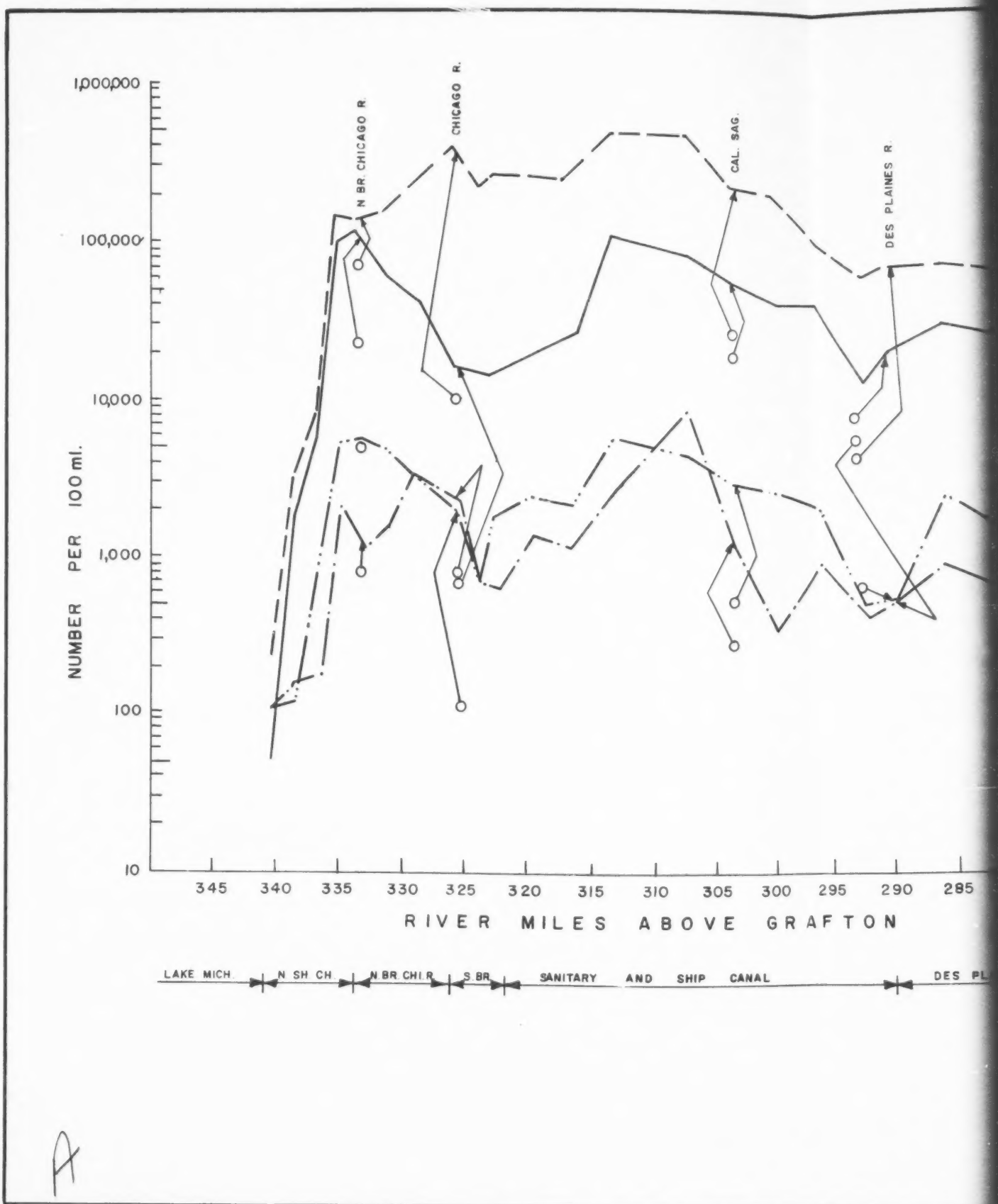
UPPER ILLINOIS RIVER BASIN

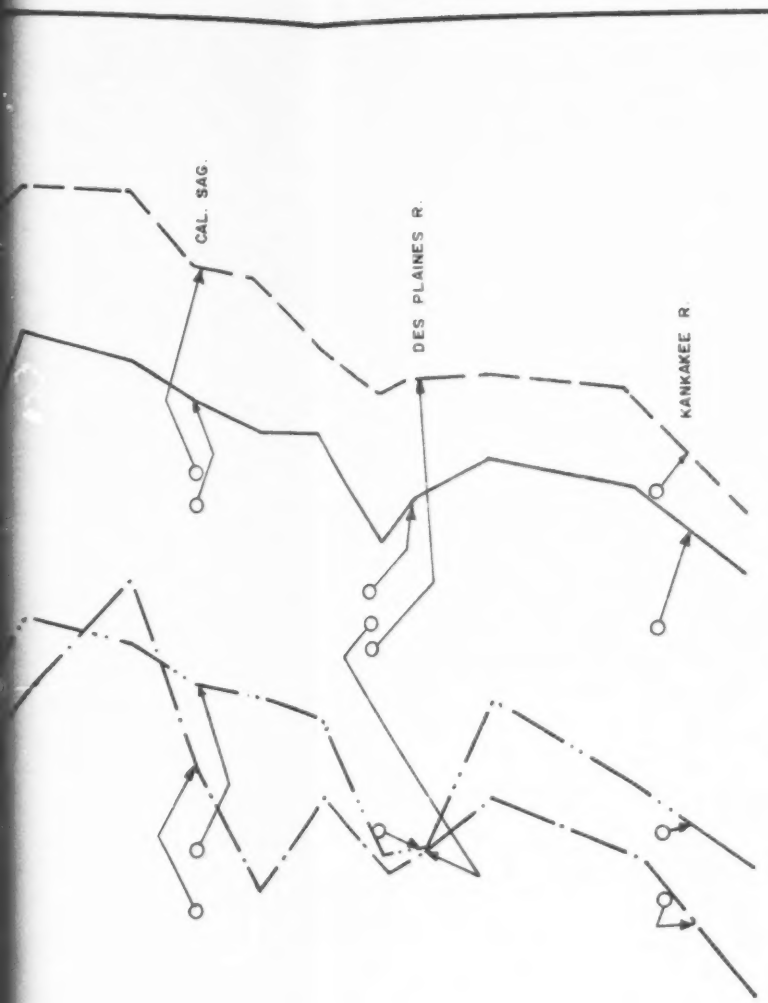
DEPT. OF HEALTH, EDUCATION, & WELFARE

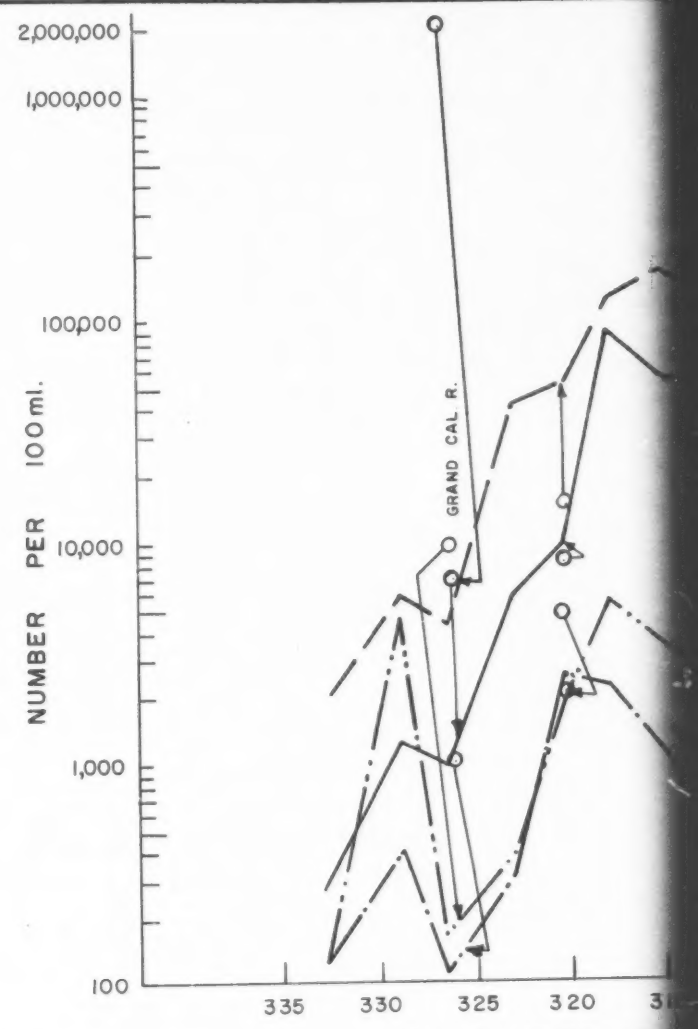
PUBLIC HEALTH SERVICE

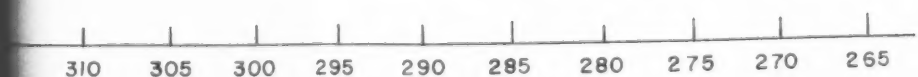
REGION V CHICAGO, ILLINOIS

FIGURE 5


1,000,000
100,000
10,000
1,000
100
10
NUMBER PER 100 ml.
N BR. CHICAGO R.
CHICAGO R.
CAL. SAG.
DES PLAINES R.
345
340
335
330
325
320
315
310
305
300
295
290
285
RIVER MILES ABOVE GRAFTON
LAKE MICH.
N. SH. CH.
N. BR. CHI. R.
S. BR.
SANITARY AND SHIP CANAL
DES PL



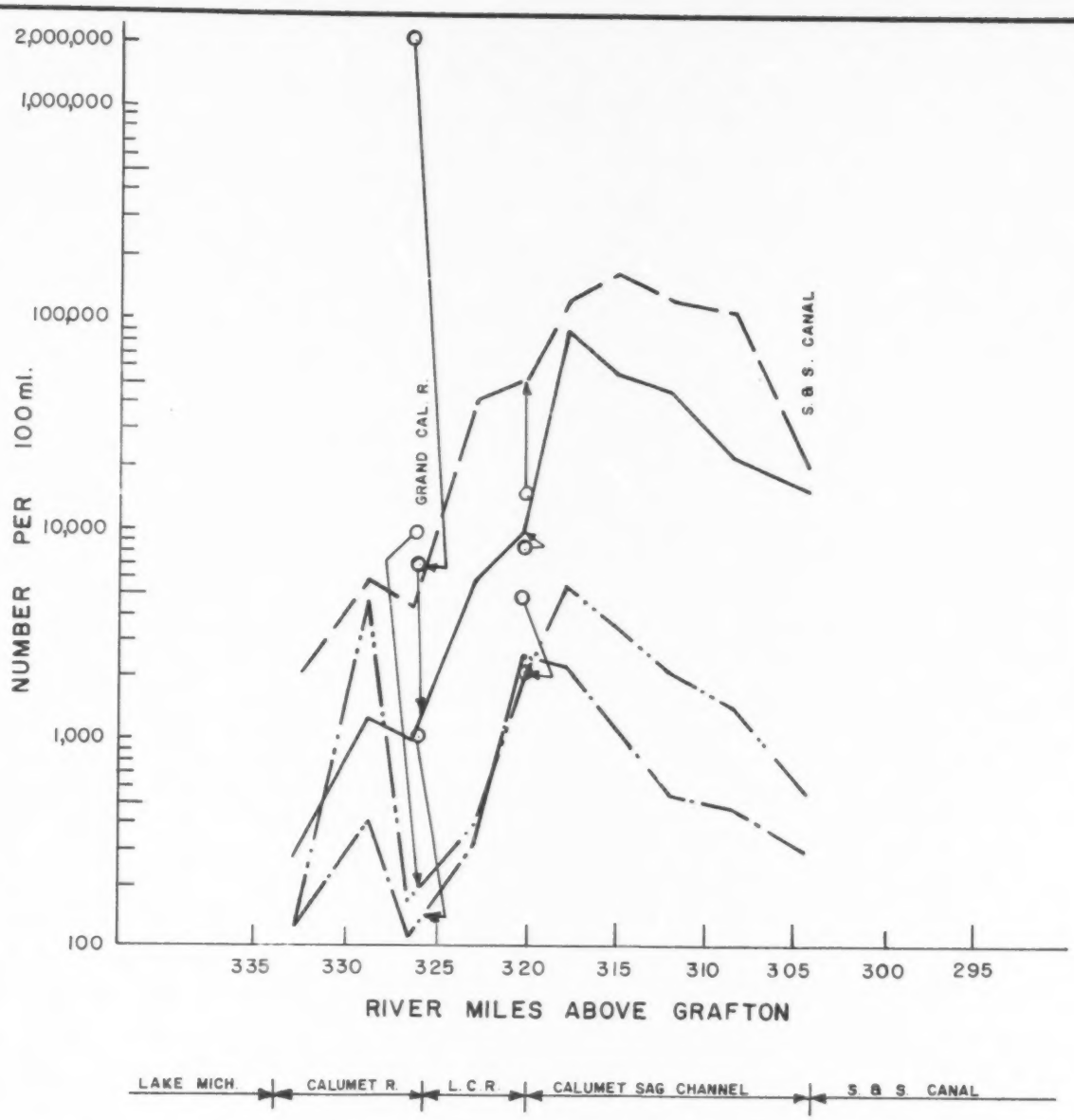



LEGEND

- Coliform – Summer Months, 4 Months Avg.
- Fecal Streptococci – Summer Months Avg.
- Coliform – Winter Months Avg.
- Fecal Streptococci – Summer Months Avg.

B




70 265

L. R

LEGEND

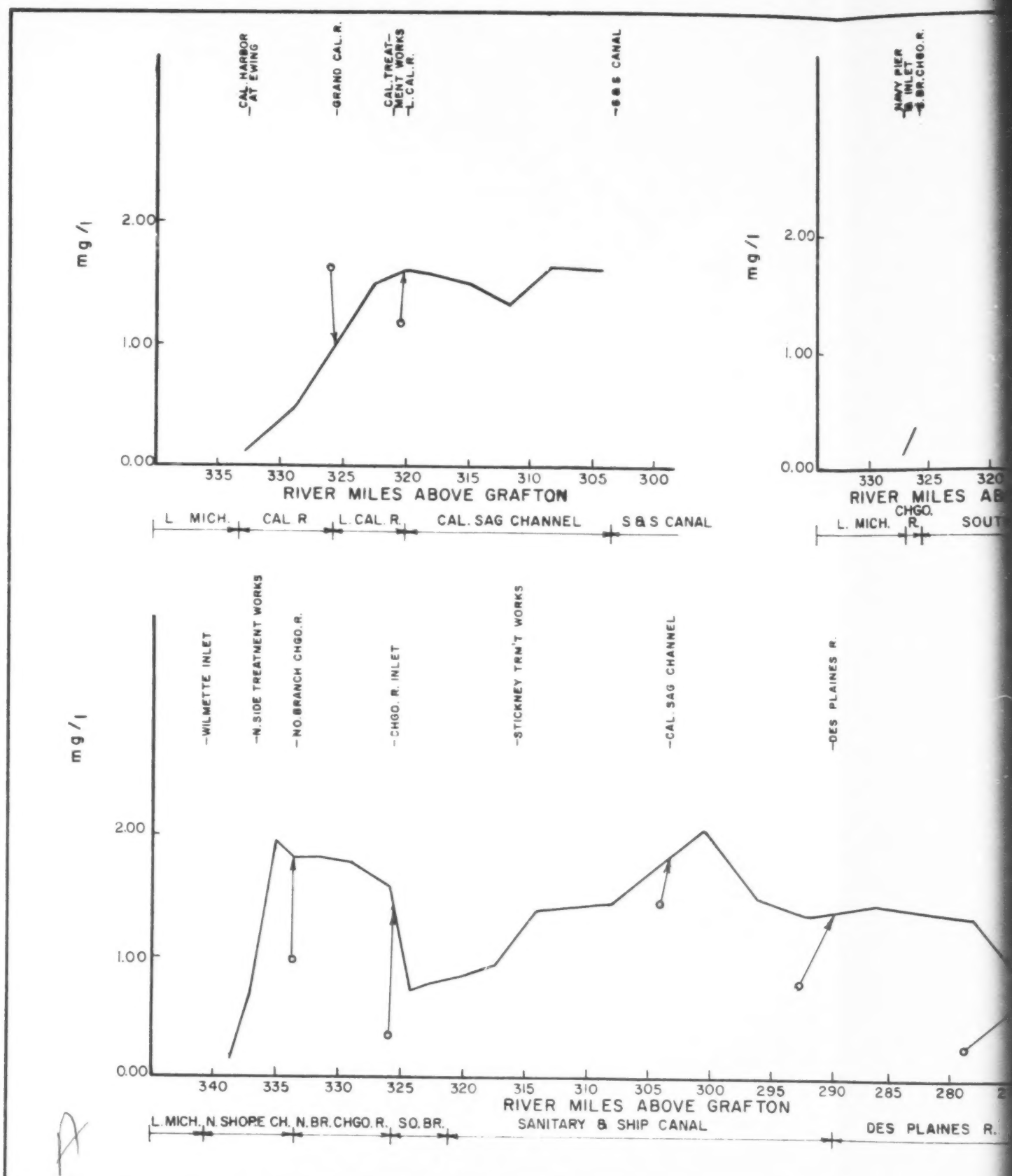
- Coliform – Summer Months, 4 Months Avg.
- Fecal Streptococci – Summer Months Avg.
- Coliform – Winter Months Avg.
- Fecal Streptococci – Summer Months Avg.

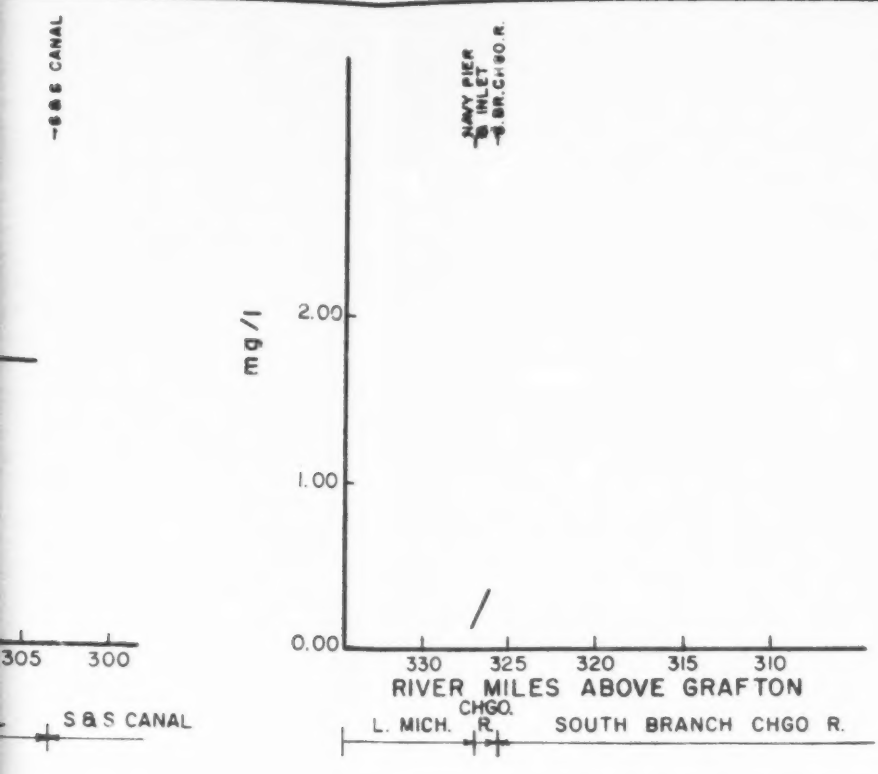
GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

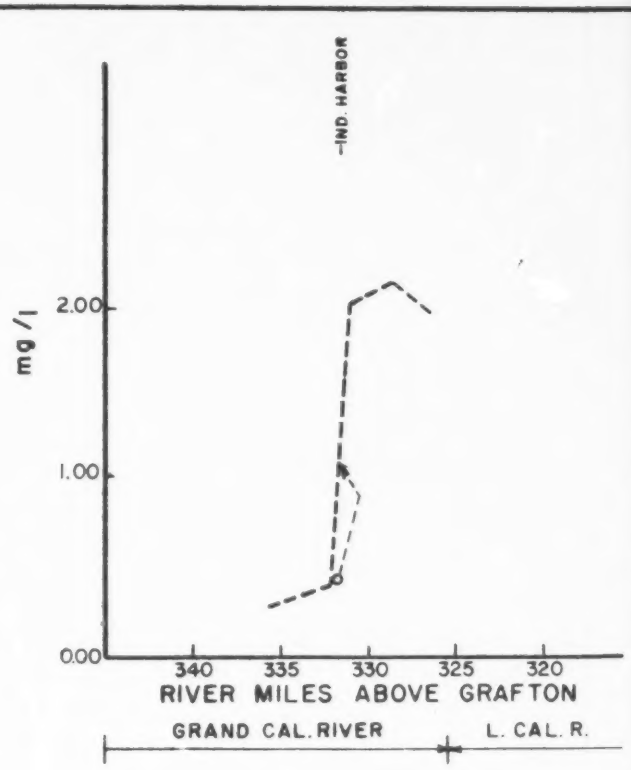
**COLIFORM & FECAL STREPTOCOCCUS DENSITIES – GEOMETRIC MEANS UPPER ILLINOIS RIVER SYSTEM**

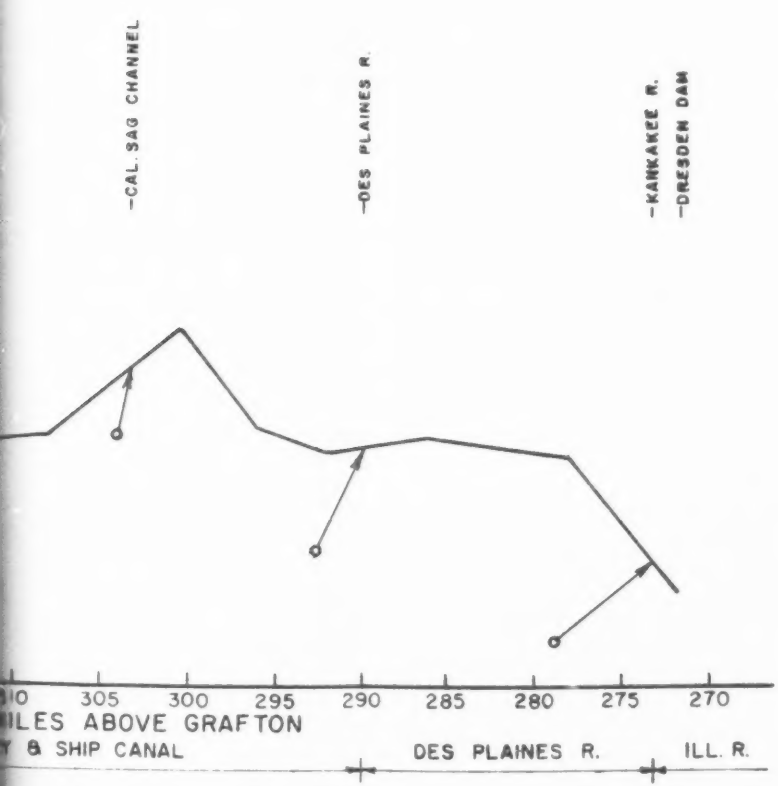
DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

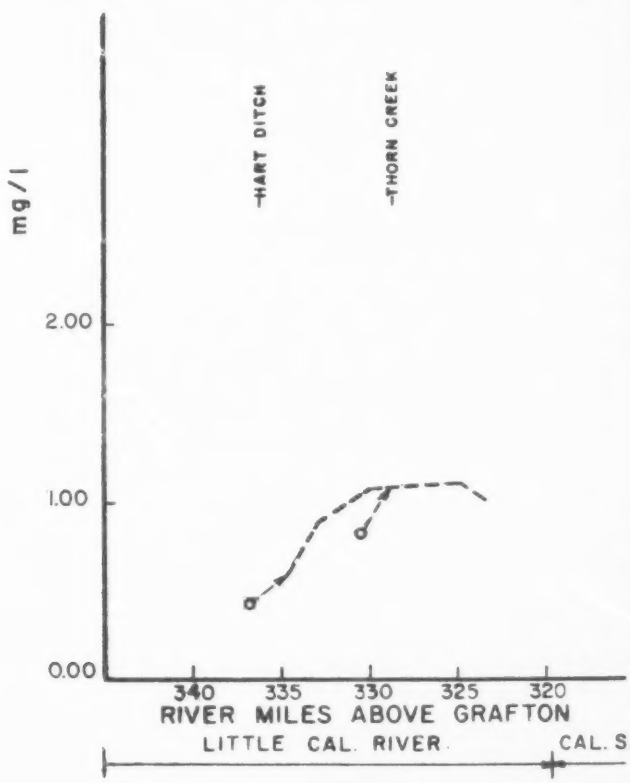
FIGURE 6

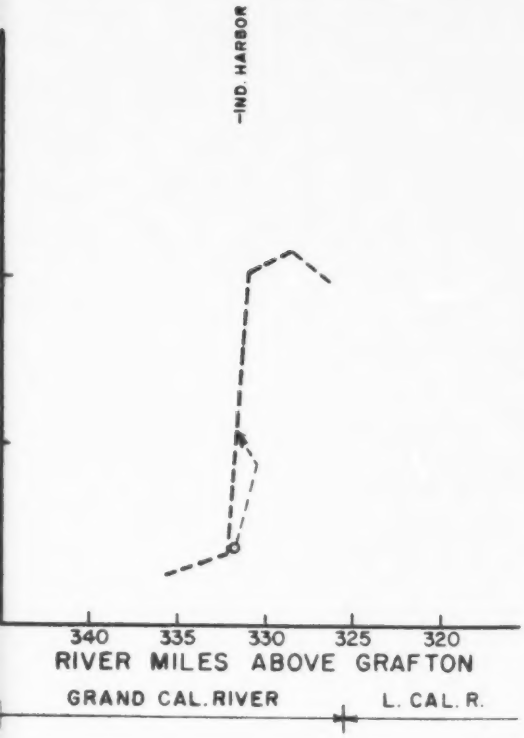

CAL. HARBOR AT EWING
GRAND CAL. R.
CAL. TREATMENT WORKS L. CAL. R.
S & S CANAL
mg/l
2.00
1.00
0.00
335 330 325 320 315 310 305 300
RIVER MILES ABOVE GRAFTON
L MICH.
CAL R
L. CAL. R.
CAL. SAG CHANNEL
S & S CANAL
NAVY PIER & INLET & BR. CHGO. R.
mg/l
2.00
1.00
0.00
330 325 320
RIVER MILES AB
CHGO. R.
L. MICH.
SOUT
WILMETTE INLET
N. SIDE TREATMENT WORKS
NO. BRANCH CHGO. R.
CHGO. R. INLET
STICKNEY TRN'T WORKS
CAL. SAG CHANNEL
DES PLAINES R.
mg/l
2.00
1.00
0.00
340 335 330 325 320 315 310 305 300 295 290 285 280
RIVER MILES ABOVE GRAFTON
L. MICH. N. SHORE CH. N. BR. CHGO. R. SO. BR.
SANITARY & SHIP CANAL
DES PLAINES R.


-S & S CANAL
NAVY PIER
INLET
BR. CHGO. R.
mg/l
2.00
1.00
0.00
330
325
320
315
310
RIVER MILES ABOVE GRAFTON
L. MICH.
CHGO. R.
SOUTH BRANCH CHGO R.
305
300
S & S CANAL


-IND. HARBOR
mg/l
2.00
1.00
0.00
340
335
330
325
320
RIVER MILES ABOVE GRAFTON
GRAND CAL. RIVER
L. CAL. R.


-CAL. SAG CHANNEL
-DES PLAINES R.
-KANKAKEE R.
-DRESDEN DAM
310
305
300
295
290
285
280
275
270
ILES ABOVE GRAFTON
Y & SHIP CANAL
DES PLAINES R.
ILL. R.

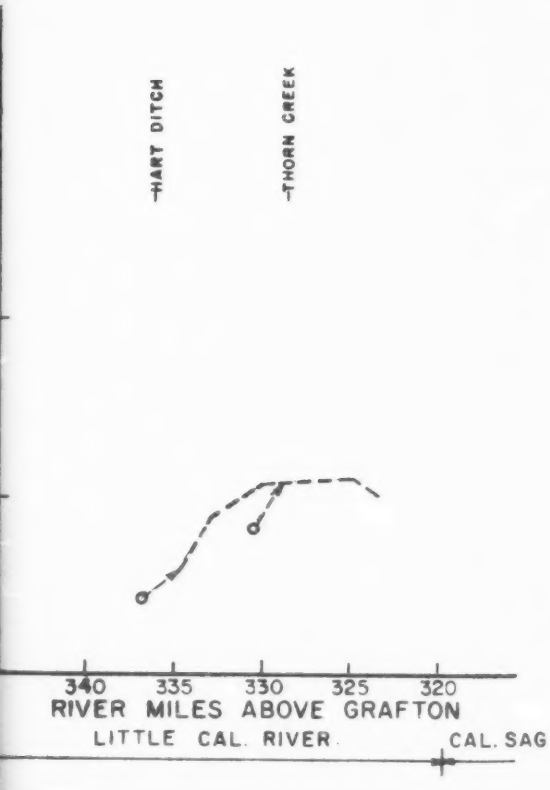

-HART DITCH
-THORN CREEK
mg/l
2.00
1.00
0.00
340
335
330
325
320
RIVER MILES ABOVE GRAFTON
LITTLE CAL. RIVER
CAL. SAG




LEGEND

JAN. ————

FEB. - - - - - - - - - -




GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

# ABS AVERAGES

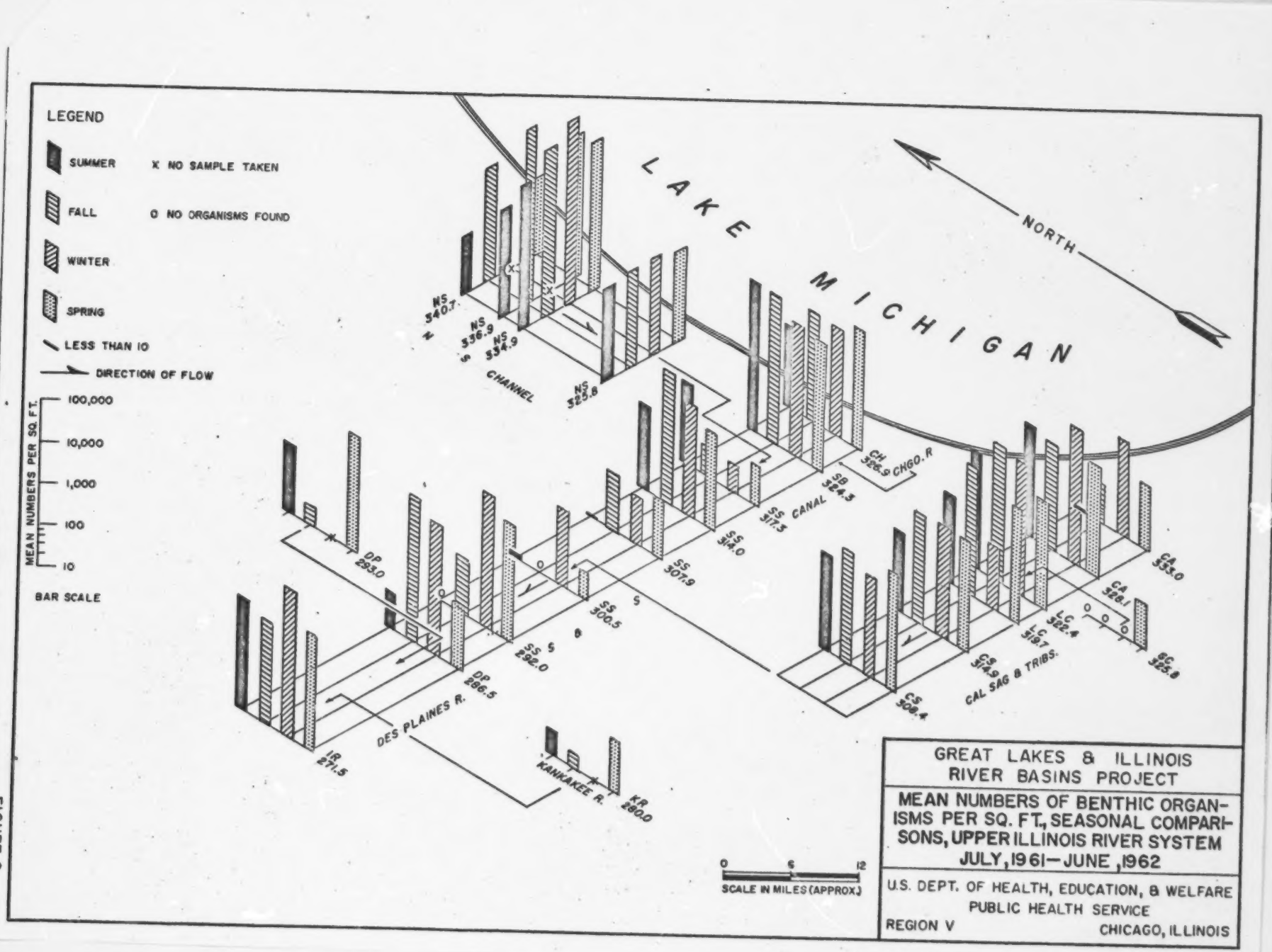
JAN. & FEB. 1962

UPPER ILLINOIS RIVER SYSTEM

DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE

REGION V CHICAGO, ILLINOIS

FIGURE 7




GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

MEAN NUMBERS OF BENTHIC ORGANISMS PER SQ. FT., SEASONAL COMPARISONS, UPPER ILLINOIS RIVER SYSTEM JULY, 1961 – JUNE, 1962

U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 8

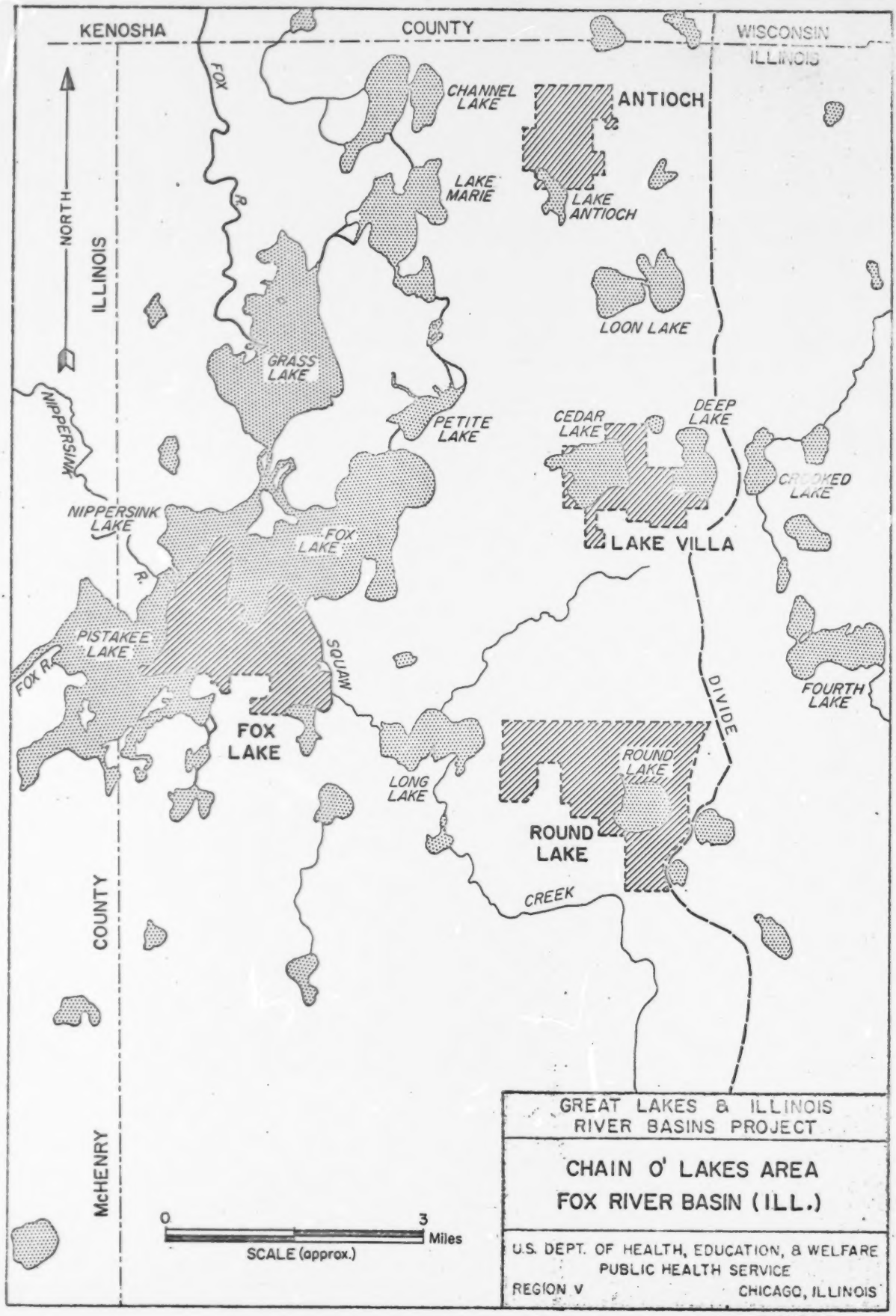
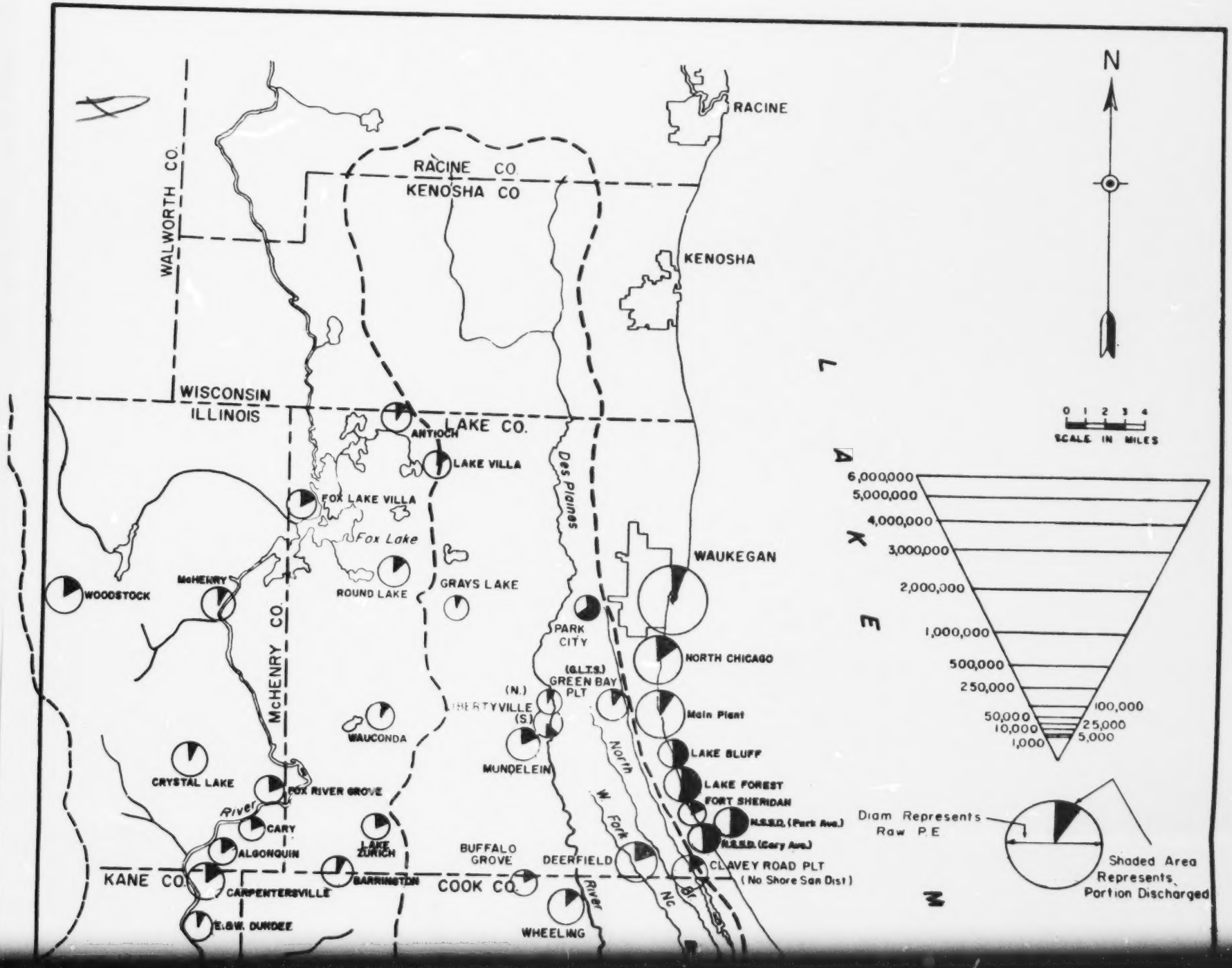
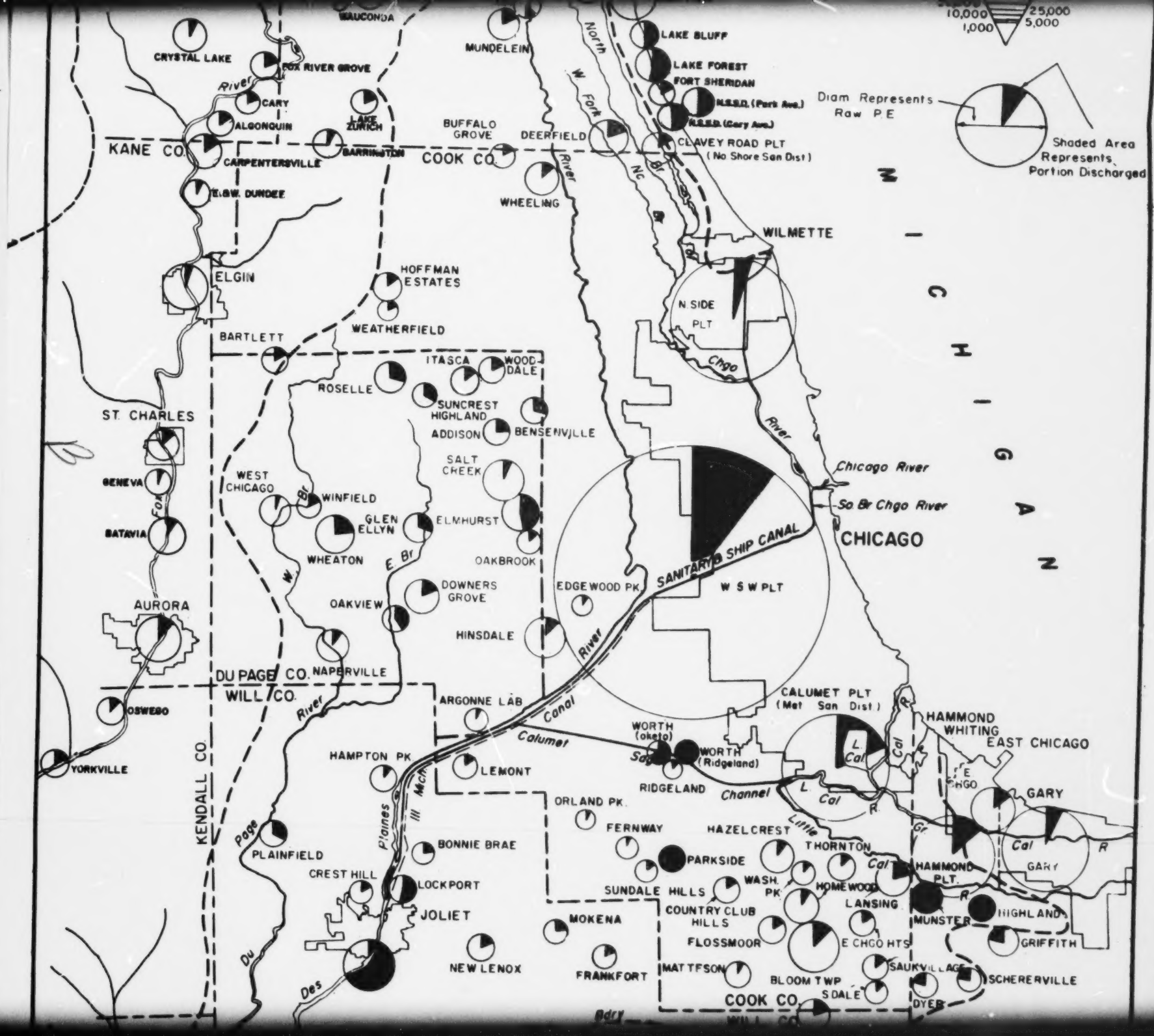
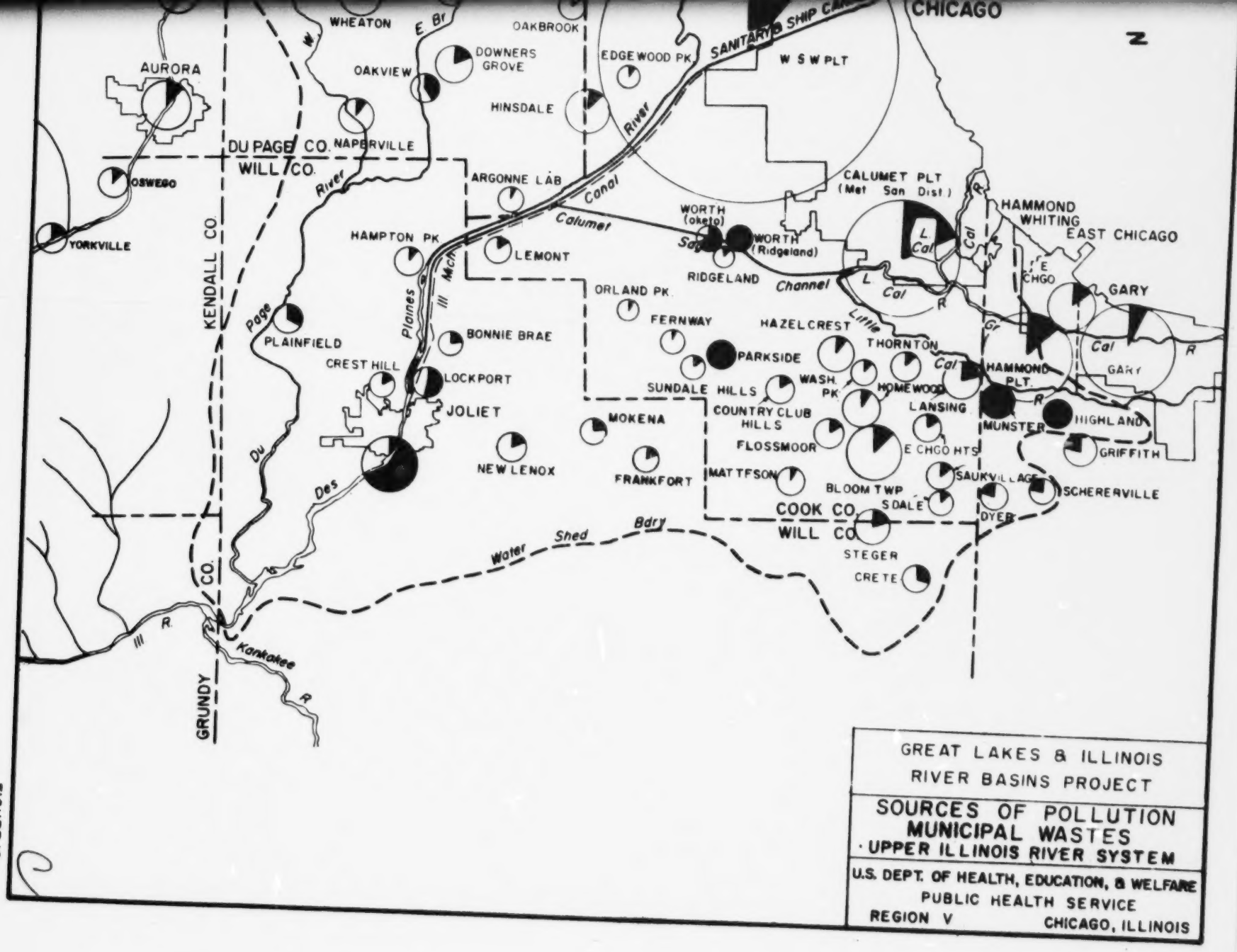

KENOSHA COUNTY
WISCONSIN
ILLINOIS
NORTH
ILLINOIS
FOX R.
CHANNEL LAKE
ANTIOCH
LAKE MARIE
LAKE ANTIOCH
LOON LAKE
GRASS LAKE
PETITE LAKE
NIPPERSINK
CEDAR LAKE
DEEP LAKE
CROOKED LAKE
NIPPERSINK LAKE
FOX LAKE
LAKE VILLA
PISTAKEE LAKE
FOX R.
SQUAW
DIVIDE
FOURTH LAKE
FOX LAKE
LONG LAKE
ROUND LAKE
ROUND LAKE
CREEK
COUNTY
McHENRY
0
3
Miles
SCALE (approx.)
GREAT LAKES & ILLINOIS RIVER BASINS PROJECT
CHAIN O' LAKES AREA
FOX RIVER BASIN (ILL.)
U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V
CHICAGO, ILLINOIS

FIGURE 9


RACINE
RACINE CO
KENOSHA CO
KENOSHA
WALWORTH CO.
WISCONSIN
ILLINOIS
LAKE CO.
ANTIOCH
LAKE VILLA
FOX LAKE VILLA
Fox Lake
Des Plaines
WAUKEGAN
WOODSTOCK
McHENRY
McHENRY CO.
ROUND LAKE
GRAYS LAKE
PARK CITY
NORTH CHICAGO
(G.L.T.S.)
GREEN BAY
PLT
(N.)
LIBERTYVILLE
(S.)
Main Plant
WAUCONDA
MUNDELEIN
LAKE BLUFF
LAKE FOREST
FORT SHERIDAN
N.S.S.D. (Park Ave.)
N.S.S.D. (Gary Ave.)
CLAVEY ROAD PLT
(No Shore San Dist)
CRYSTAL LAKE
FOX RIVER GROVE
River
CARY
ALGONQUIN
LAKE ZURICH
BUFFALO GROVE
DEERFIELD
North
W. Fork
KANE CO.
BARRINGTON
COOK CO.
CARPENTERSVILLE
E.&W. DUNDEE
WHEELING
River
N
SCALE IN MILES
0 1 2 3 4
LAKE
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
500,000
250,000
100,000
50,000
25,000
10,000
5,000
1,000
Diam Represents
Raw P.E
Shaded Area
Represents
Portion Discharged


10,000
1,000
25,000
5,000
Diam Represents Raw P.E
Shaded Area Represents Portion Discharged
CRYSTAL LAKE
FOX RIVER GROVE
CARY
ALGONQUIN
LAKE ZURICH
BARRINGTON
CARPENTERSVILLE
E.GIN
DUNDEE
KANE CO.
ELGIN
HOFFMAN ESTATES
WEATHERFIELD
BARTLETT
ST. CHARLES
GENEVA
BATAVIA
AURORA
OSWEGO
YORKVILLE
KENDALL CO.
DU PAGE CO.
WILL CO.
NAPERVILLE
ROSELLE
ITASCA
WOOD DALE
SUNCREST HIGHLAND
ADDISON
BENSENVILLE
SALT CREEK
WEST CHICAGO
WINFIELD
GLEN ELLYN
ELMHURST
WHEATON
OAKBROOK
DOWNERS GROVE
OAKVIEW
HINSDALE
EDGEWOOD PK.
ARGONNE LAB
HAMPTON PK
LEMONT
PLAINFIELD
BONNIE BRAE
CREST HILL
LOCKPORT
JOLIET
NEW LENOX
MOKENA
FRANKFORT
ORLAND PK.
FERNWAY
PARKSIDE
SUNDALE
HILLS
COUNTRY CLUB HILLS
FLOSSMOOR
MATTESON
BLOOM TWP
S DALE
COOK CO.
WILL CO.
DYER
SCHERERVILLE
SAUKVILLAGE
GRIFFITH
HIGHLAND
MUNSTER
HAMMOND PLT.
LANSING
HOMEWOOD
WASH. PK
HAZELCREST
THORNTON
GARY
HAMMOND
WHITING
EAST CHICAGO
CALUMET PLT (Met San Dist)
RIDGELAND
WORTH (Ridgeland)
WORTH (oketo)
MUNDELEIN
LAKE BLUFF
LAKE FOREST
FORT SHERIDAN
N.S.S.D. (Park Ave.)
N.S.S.D. (Gary Ave.)
CLAVEY ROAD PLT (No Shore San Dist)
BUFFALO GROVE
DEERFIELD
WHEELING
North Br
W Fork
River
WILMETTE
N SIDE PLT
Chgo
Chicago River
So Br Chgo River
CHICAGO
SANITARY & SHIP CANAL
W S W PLT
Calumet River
Canal
Channel
Little Calumet R
Des Plaines R
Du Page R
Des Plaines
Du Page
Calumet
Sag
Cal
R
L
Gr
E CHGO HTS
Bdry




GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

SOURCES OF POLLUTION
MUNICIPAL WASTES
· UPPER ILLINOIS RIVER SYSTEM

U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 10

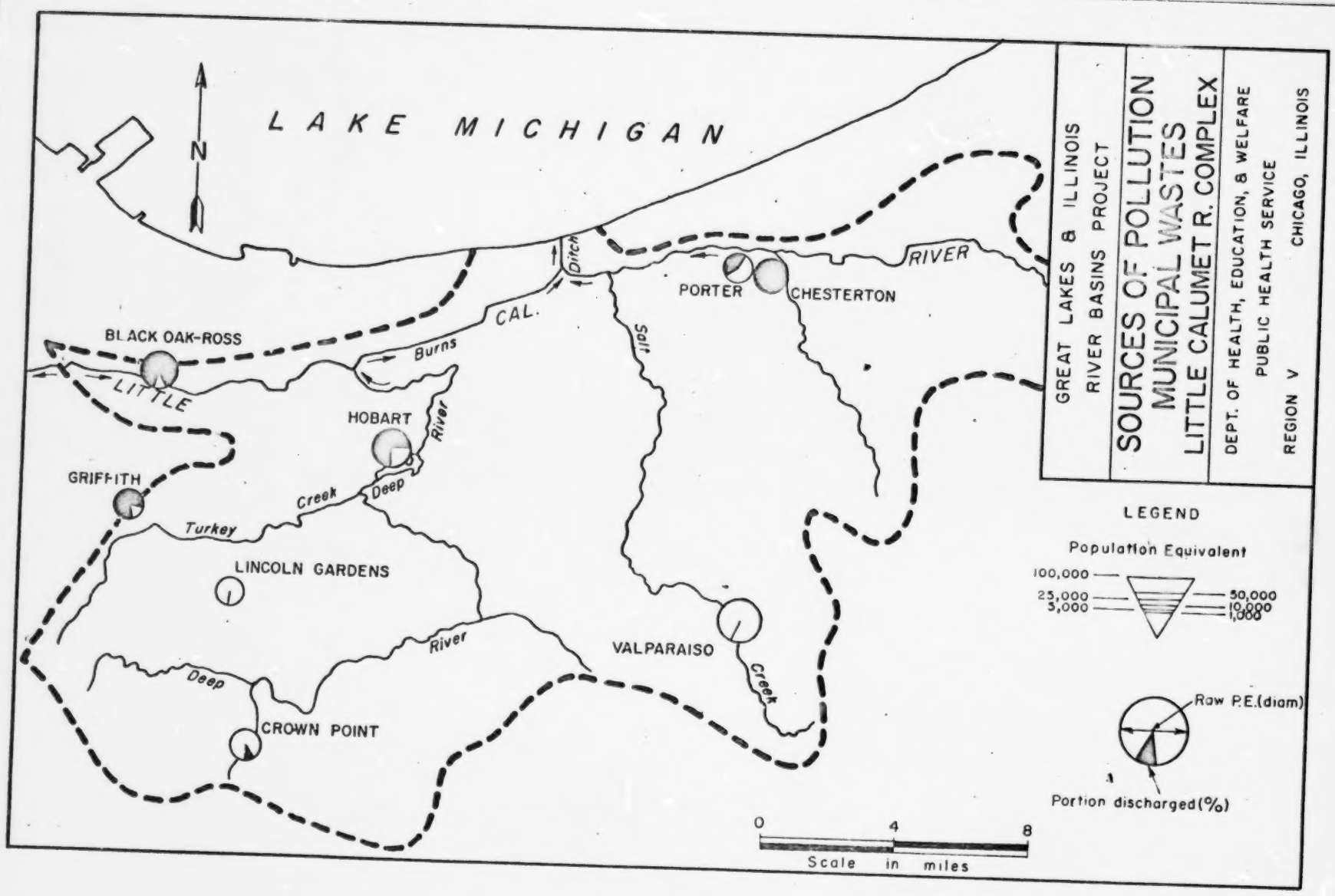
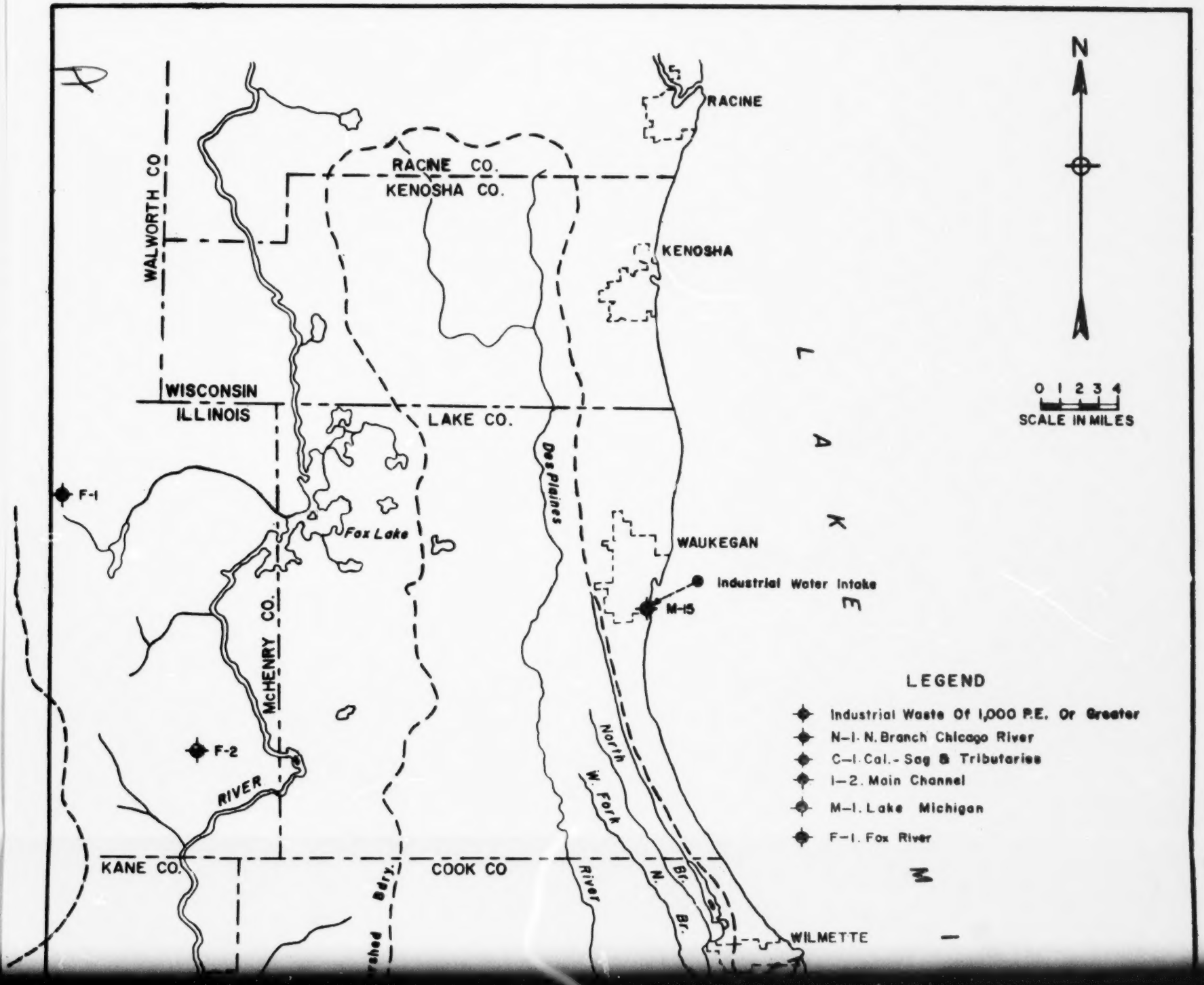
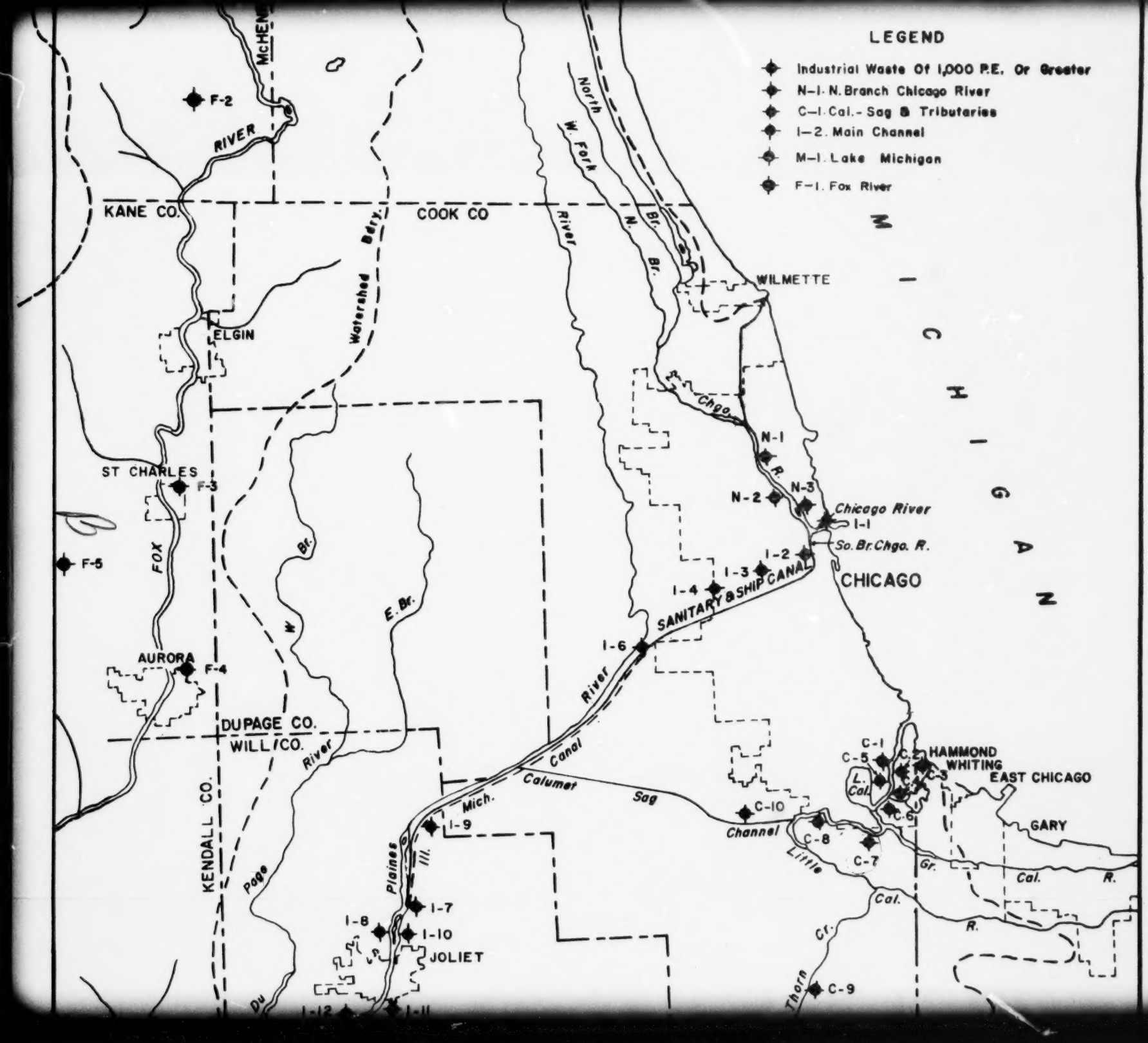
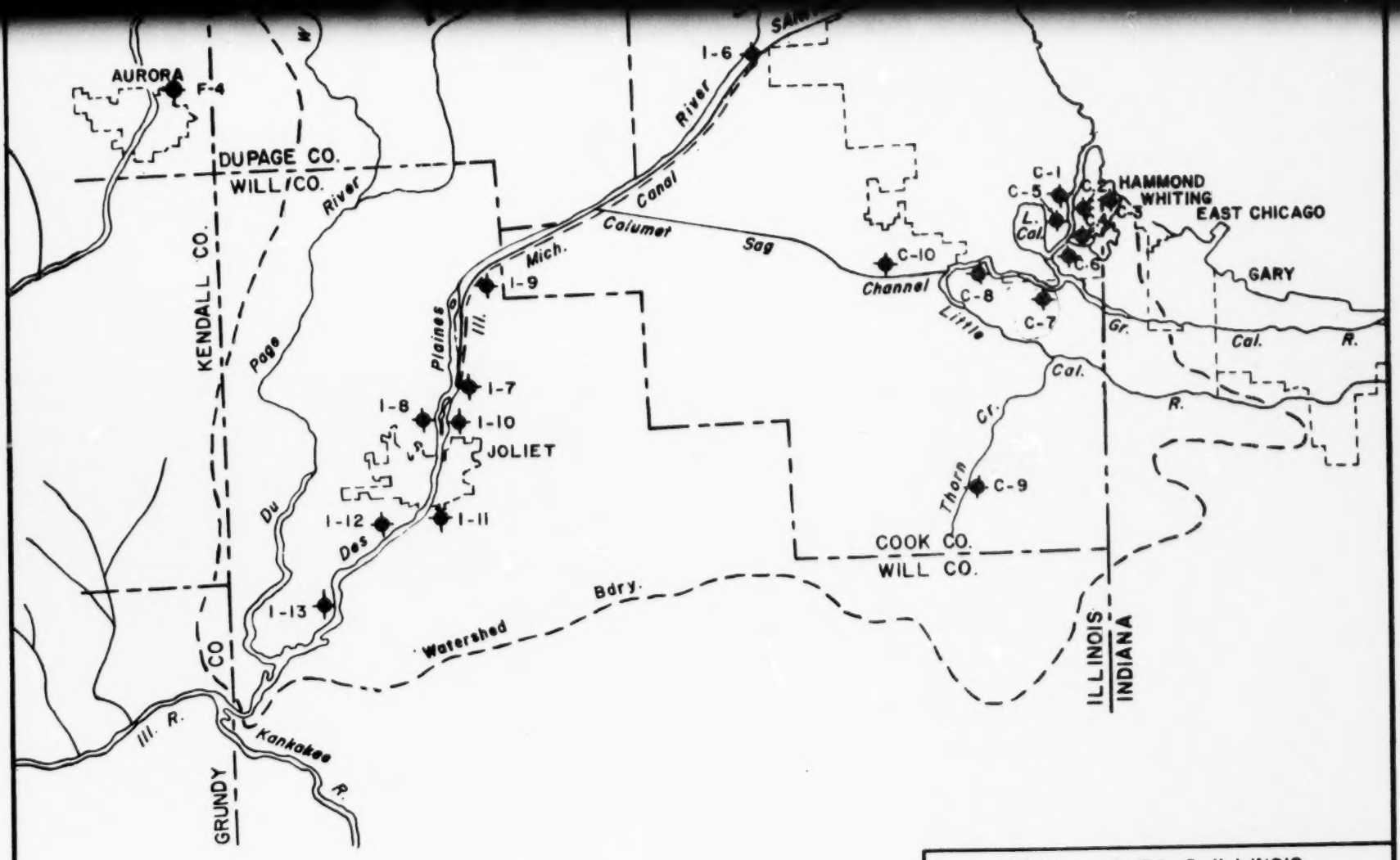

LAKE MICHIGAN
N
Ditch
RIVER
PORTER
CHESTERTON
CAL.
Burns
Salt
BLACK OAK-ROSS
LITTLE
HOBART
River
GRIFFITH
Creek
Deep
Turkey
LINCOLN GARDENS
River
Deep
CROWN POINT
VALPARAISO
Creek
GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT
SOURCES OF POLLUTION
MUNICIPAL WASTES
LITTLE CALUMET R. COMPLEX
DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V
CHICAGO, ILLINOIS
LEGEND
Population Equivalent
100,000
25,000
3,000
50,000
10,000
1,000
Raw P.E.(diam)
Portion discharged(%)
0
4
8
Scale in miles

FIGURE II


N
RACINE
RACINE CO.
KENOSHA CO.
KENOSHA
WALWORTH CO
WISCONSIN
ILLINOIS
LAKE CO.
LAKE
0 1 2 3 4
SCALE IN MILES
F-1
Fox Lake
Des Plaines
WAUKEGAN
Industrial Water Intake
M-15
McHENRY CO.
F-2
RIVER
North
W. Fork
N. Br.
River
KANE CO.
COOK CO
Drainage Canal
WILMETTE
LEGEND
Industrial Waste Of 1,000 P.E. Or Greater
N-1. N. Branch Chicago River
C-1. Cal.-Sag & Tributaries
I-2. Main Channel
M-1. Lake Michigan
F-1. Fox River


LEGEND
Industrial Waste Of 1,000 P.E. Or Greater
N–1. N. Branch Chicago River
C–1. Cal.-Sag & Tributaries
I–2. Main Channel
M–1. Lake Michigan
F–1. Fox River
F-2
McHENRY
RIVER
KANE CO.
COOK CO
Watershed Bdry.
North Br.
W. Fork
River
N. Br.
WILMETTE
ELGIN
Chgo.
N-1
R.
N-2
N-3
Chicago River
I-1
So. Br. Chgo. R.
I-2
I-3
I-4
CHICAGO
SANITARY & SHIP CANAL
ST CHARLES
F-3
F-5
FOX
W. Br.
E. Br.
I-6
AURORA
F-4
River
DUPAGE CO.
WILL CO.
KENDALL CO.
Canal
Calumet
Sag
Mich.
C-1
C-5
C-2
C-4
C-3
HAMMOND
WHITING
EAST CHICAGO
L. Cal.
C-6
C-10
Channel
I-9
Plaines
Ill.
Page
C-8
C-7
Little
Gr.
GARY
Cal.
R.
I-7
I-8
I-10
JOLIET
Cr.
Thorn
C-9
Du
I-12
I-11

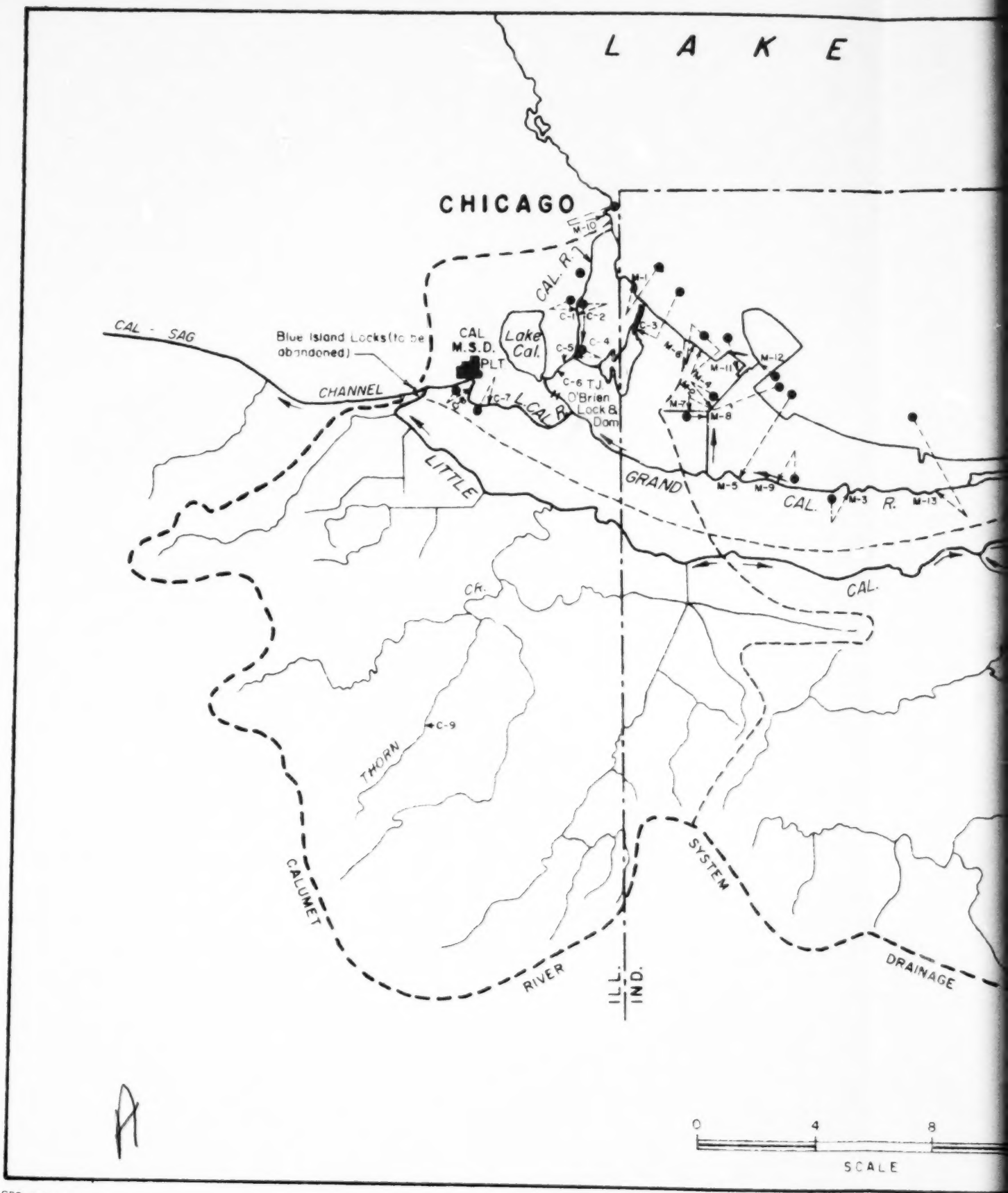



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

SOURCES OF POLLUTION
INDUSTRIAL WASTES
UPPER ILLINOIS RIVER BASIN

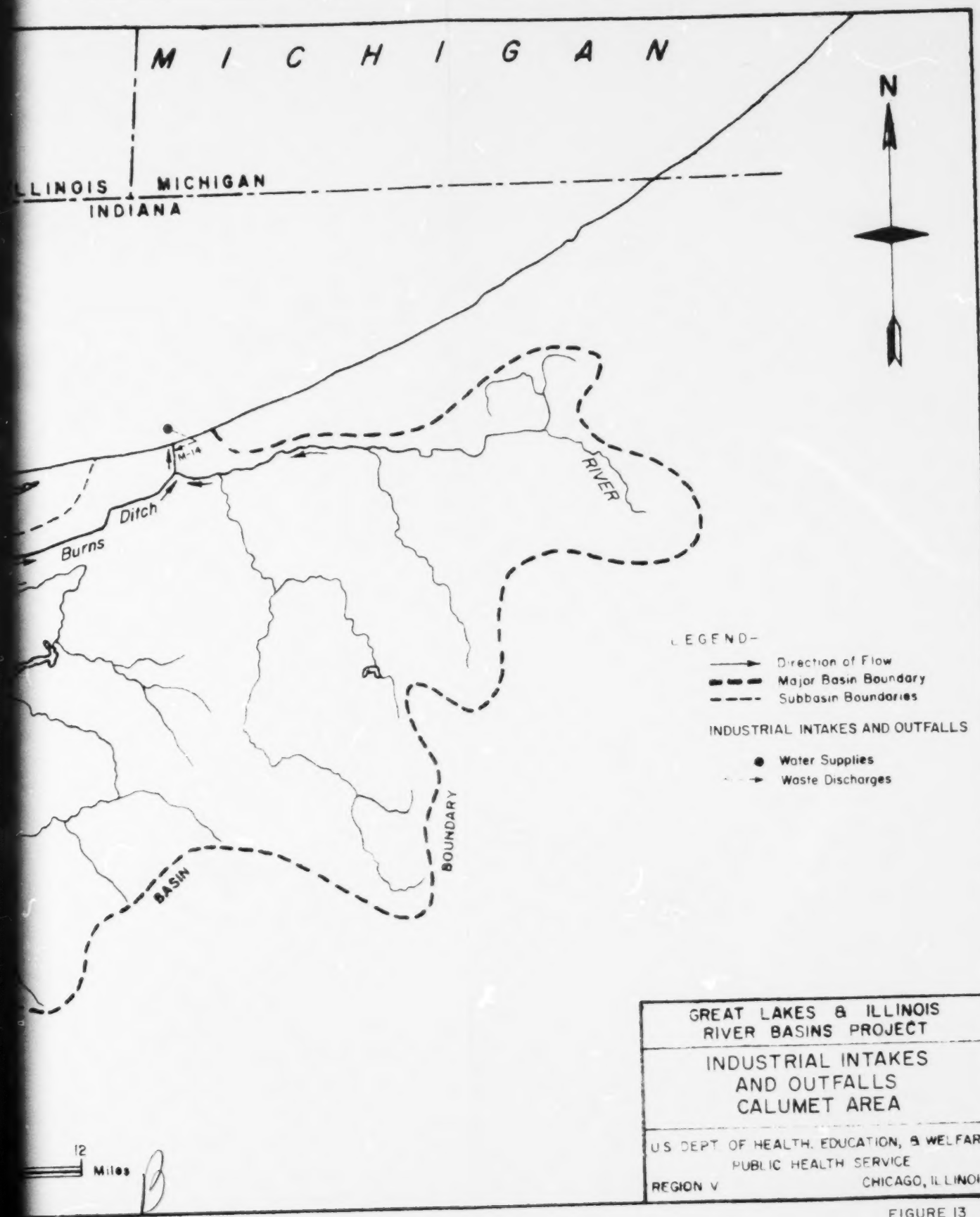
U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 12


LAKE
CHICAGO
M-10
CAL. R.
M-1
C-1
C-2
C-3
C-4
C-5
M-6
M-11
M-12
M-7
M-8
CAL - SAG
CHANNEL
Blue Island Locks (to be abandoned)
CAL M.S.D. PLT
Lake Cal.
C-6 T.J. O'Brien Lock & Dam
C-7
L. CAL R.
LITTLE
GRAND
M-5
M-9
CAL.
M-3
R.
M-13
CR.
CAL.
C-9
THORN
CALUMET
RIVER
ILL.
IND.
SYSTEM
DRAINAGE
0
4
8
SCALE

GPO 803-742

LAKE
MICHIGAN
ILLINOIS
INDIANA
MICHIGAN
C-1
C-2
C-3
C-4
M-1
M-2
M-3
M-4
M-5
M-6
M-7
M-8
M-9
M-11
M-12
M-13
M-14
T.J. O'Brien Lock & Dam
GRAND CAL. R.
CAL.
Burns Ditch
RIVER
ILL.
IND.
DRAINAGE SYSTEM
BASIN
BOUNDARY
0
4
8
12
Miles
SCALE
B




GREAT LAKES & ILLINOIS RIVER BASINS PROJECT

INDUSTRIAL INTAKES AND OUTFALLS CALUMET AREA

U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIGURE 13

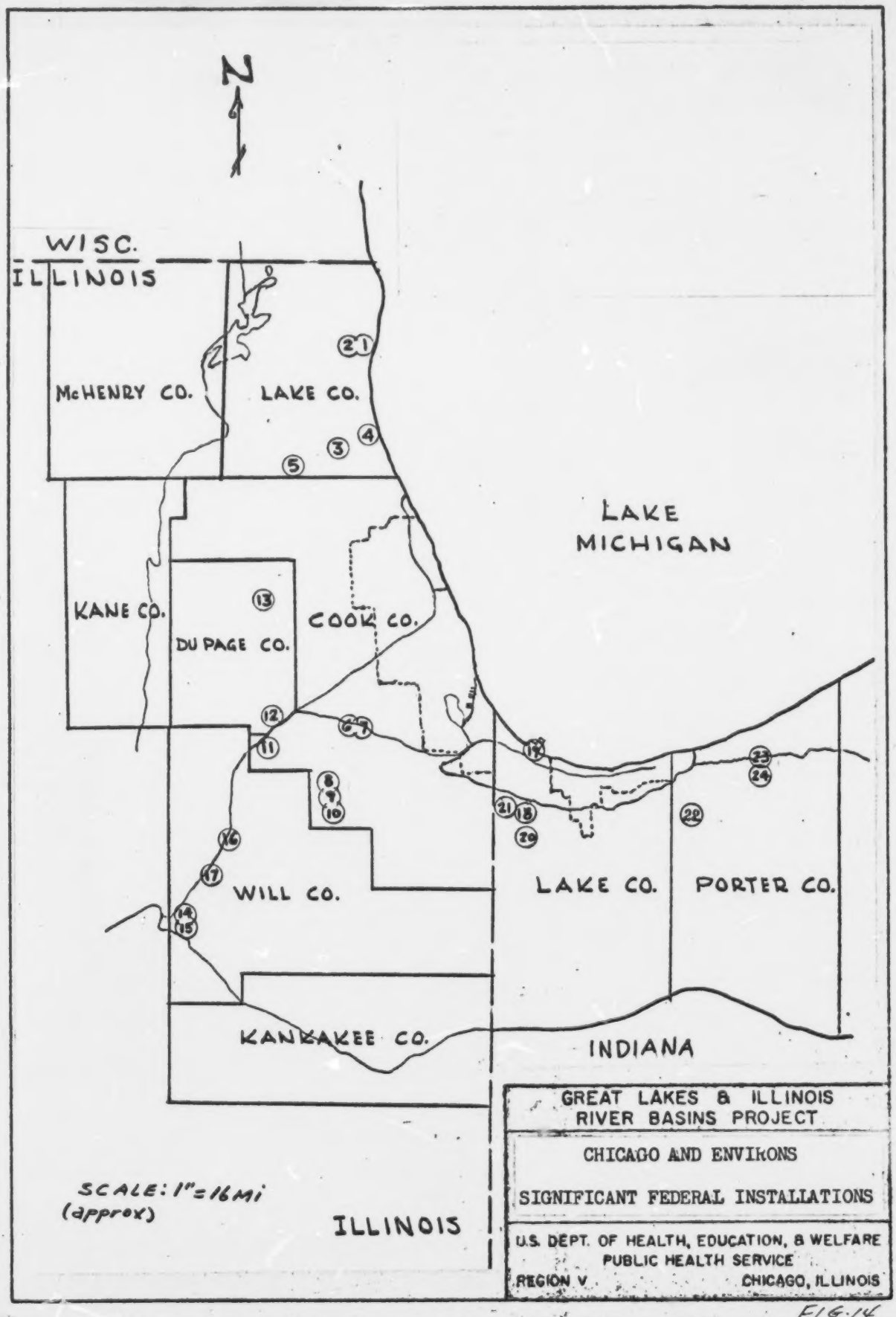

N
WISC.
ILLINOIS
McHENRY CO.
LAKE CO.
LAKE MICHIGAN
KANE CO.
DU PAGE CO.
COOK CO.
WILL CO.
LAKE CO.
PORTER CO.
KANKAKEE CO.
INDIANA
ILLINOIS
SCALE: 1"=16Mi (approx)
GREAT LAKES & ILLINOIS RIVER BASINS PROJECT
CHICAGO AND ENVIRONS
SIGNIFICANT FEDERAL INSTALLATIONS
U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION V CHICAGO, ILLINOIS

FIG. 14

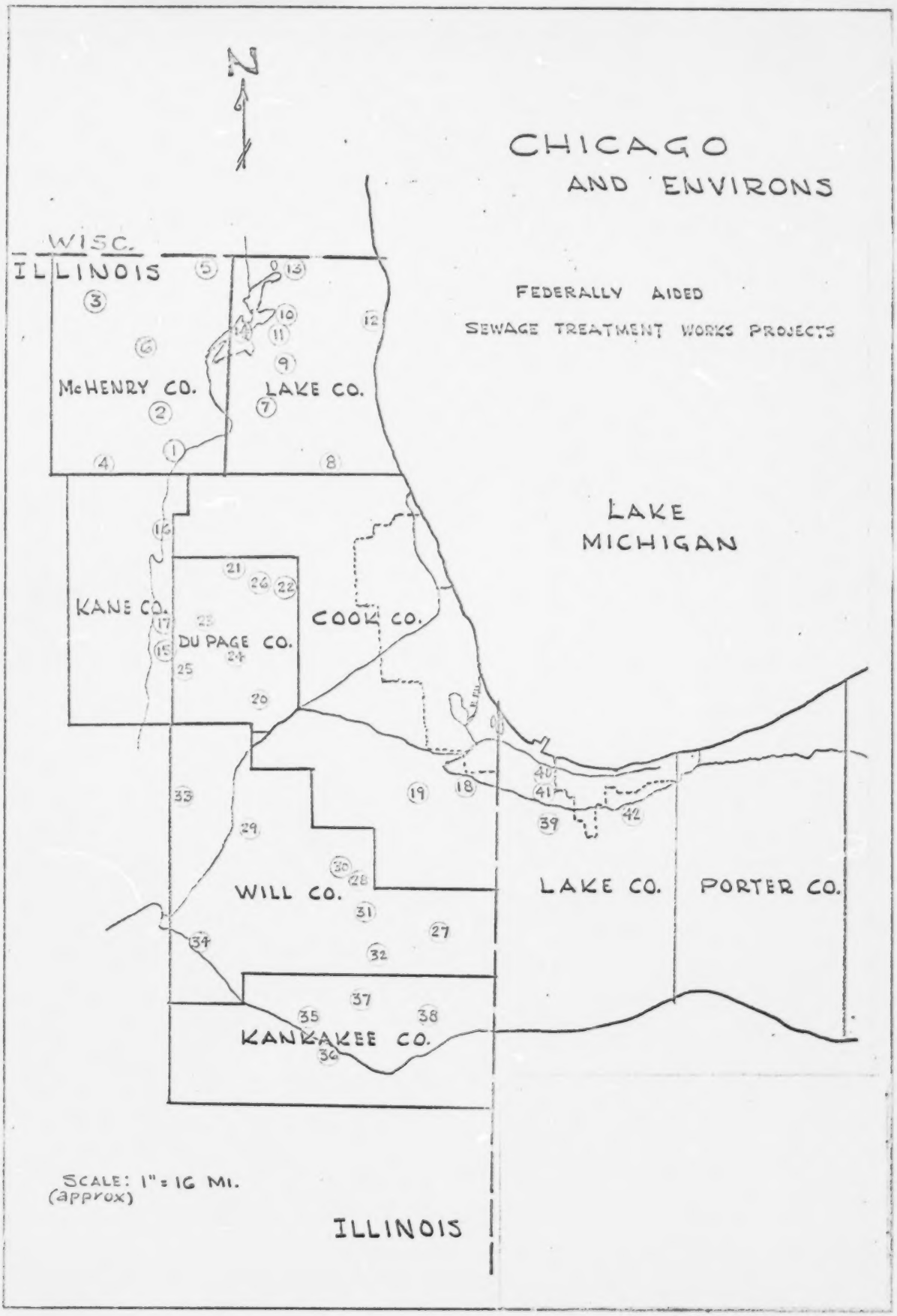

N
CHICAGO
AND ENVIRONS
FEDERALLY AIDED
SEWAGE TREATMENT WORKS PROJECTS
WISC.
ILLINOIS
McHENRY CO.
LAKE CO.
KANE CO.
DU PAGE CO.
COOK CO.
LAKE
MICHIGAN
WILL CO.
LAKE CO.
PORTER CO.
KANKAKEE CO.
SCALE: 1" = 16 MI.
(approx)
ILLINOIS

FIGURE 15